Commercial Fisheries Abstracts

a monthly summary of important developments for the fishery industries

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Commercial Fisheries Abstracts

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Following is a brief outline of this filing system. The numbers apply to the first digit appearing on each card. For the meaning of subsequent digits, please see the above described leaflet.

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3	Preserved fish	8	Composition
4	Oils	9	Miscellaneous

Issued with the approval of the Bureau of the Budget, December 29, 1953

0.6 WHY NOT A FOOD TECHNOLOGIST FOR YOUR PLANT?

Livingston, Gideon E. (University of Massachusetts, Amherst)
Food Engineering 27, No. 6, 105-106, 209 (June 1955)

Many small and medium-sized food packers feel they do not need a food technologist. This opinion is based on three points: (1) quality control is considered too expensive, (2) plants operate successfully without them, and (3) technical advice is available through organizations such as trade associations and government agencies. There is some justification for these points, but the advantages of employing technological personnel are worth investigation.

Responsibilities of food technologists include inspection of legal standards and sales specifications to insure quality of the product. Without a quality control supervisor, standards of defects, fills, color, mold count and other criteria of quality are likely to slip.

The laboratory food technologist can often be of assistance in developing new products. He can usually suggest the proper ingredients required to produce desired characteristics and can also determine processing or packaging requirements. Often he can anticipate manufacturing or storage difficulties before they appear.

A trained food technologist can also interpret technical and sales literature dealing with products and techniques. In the competitive food industry continued success is dependent upon a constantly improving product. Each new development in the fields of handling or preparing raw materials, processing or packaging of foods should be evaluated to determine its comparative economy and quality of product.

(over)

 ABSTRACTER: Lois Elgin

0.5 MICROBIOLOGICAL PROBLEMS OF SEMI-PRESERVED MEAT

Buttiaux, H.
Symposium on cured and frozen fish technology, Swedish Institute for Food Preservation Research, Goteborg, No. 100, Chapter 6 (November 1953)

Appropriate hygienic pasteurization and storage measures are necessary to prevent deterioration of semipreserved fish and meat. Psychrophilic lactobacilli capable of growing at temperatures of 4° C. and having a tolerance to 50 percent NaCl were found to cause green discoloration in poorly pasteurized ham stored at 4° C. The development of swarms of Proteus and Pseudomonas species at refrigerated temperatures of 2° - 4° C. in the slime of pickled ham was also noted.

In addition to causing "hard swells", bacilli are capable of producing the condition known as "flat sour" in preserved and semipreserved food products. The presence of the Fe ion in cans inhibits in some degree the production of botulinus toxin. The growth of denitrifying gas-producing bacilli is suppressed at storage temperatures of 4 - 6° C. Maintenance of this temperature range is particularly important for products being transported over great distances for long periods of time.

A Streptococcus found in ham, and resembling Streptococcus fecalis, can be differentiated from the latter on the basis of its ability to coagulate milk, resist penicillin, and decarboxylate tyrosine.

Apart from intoxication caused by Cl. botulinum, Salmonella, and Staphylococcal enterotoxin, in many instances it is difficult to predict which bacteria found in contaminated food is capable of producing this syndrom. Cl. perfringens A was reported to cause intoxication symptoms similar to those caused by the previously mentioned organisms.

(over)

 ABSTRACTER: E. A. Pachtman

1.016 AFRICA'S Ł 11 MILLION PILCHARD COAST

Anonymous
Fisheries Newsletter (Australia) 14, No. 4, 11, 13 (April 1955)

The African pilchard-maasbanker (jack mackerel) fishery has grown in 9 years from insignificance to a valuable industry. A 58-page survey of the industry in the South African Shipping News breaks down the products value of the industry in South African waters as follows:

One million five hundred cases (48 x 1 pound) canned fish, Ł 3,000,000; 40,000 tons meal, Ł 2,000,000; and 12,000 tons oil, Ł 500,000. Of the canned fish, one million cases were maasbanker, 400,000 pilchard and 112,000 mackerel

This fish harvest is taken along only 150 miles of the arid west coast of the Cape, from Saldanha to Thorn Bay. For conservation purposes, South Africa has limited the pilchard-maasbanker catch to 250,000 tons in its own waters and a similar ceiling in the Trust territory of Southwest Africa. There is also a closed season from September through December.

The industry's spectacular growth has been due in part to the help of the Fisheries Development Corporation which in addition to investing in the fishing and processing companies and granting housing loans to them, has itself provided housing at Lambert's Bay, Stompneus, and Laaiplek. It also advanced Ł 50,000 to the Southwest Administration for housing at Walvis Bay.

Through a California firm, South Africa is exporting canned jack mackerel and pilchards to the U.S.A. Pilchards are also being exported to Malaya.

(over)

 ABSTRACTER: Kathryn L. Osterhaug

1.81 AN ANALYSIS OF STARFISH CONTROL MEASURES AS PRACTICED BY OYSTERMEN

Lee, Charles F. (Fish and Wildlife Service, College Park, Maryland)
National Fisherman 36, No. 4, 19-20 (May 1955)

Starfish show large fluctuations in abundance from year to year, believed due to the intensified control measures producing a decrease in population followed by slackened controls allowing increases. Starfish migrations from uncultivated areas not subject to control measures are considered largely responsible for maintenance of the starfish population.

Starfish spawning usually starts in June, some two weeks before oyster spawning in the same waters. Having spawned earlier, the young starfish when first changed from the larval stage may consume the newly set oyster spat and virtually wipe out a good set. For this reason, it is desirable that the oyster beds be cleaned of as many adult starfish as possible before they begin to spawn.

Surveys have shown that the depth distribution for starfish and oysters are very similar in a given area. The starfish is much more susceptible to changes in salinity than the oyster, and the starfish cannot endure a salinity of less than 16 or 18 parts per thousand, such as would be found in bay areas near river outlets.

Accurate estimates of the damage caused to the oyster industry by the starfish are difficult to make since such an estimate should include both the direct cost of control efforts and the potential value of young oysters, marketable seed-stock, and older oysters lost. It has been estimated that each bushel of starfish would destroy about $1,000 worth of 1 or 2-year-old seed oysters. Starfishing vessels usually catch 6 to 10 bushels per day per vessel, but in seasons of abundance, yields may average 25 bushels per day, with catches as high as 100 bushels.

(over)

 ABSTRACTER: Alan S. Beggs

VALUE OF FOOD TECHNOLOGISTS

AFRICAN PILCHARD FISHING

SANITATION PROBLEMS

STARFISH CONTROL

1.016 (Cross Reference: 1.20)

Research is needed to determine what the optimum annual catch of these fish is in the waters of the Union of South Africa. The present limitation of 250,000 tons in each of the two areas may be either above or below the optimum.

1.81 (Cross Reference: 9.15)

Mopping, dredging, and liming are the control methods in most general use. Mopping causes little damage to the delicate seed-oysters and effectively and thoroughly cleans areas where few starfish are located. The starfish mop, or tangle, is usually a home-made rig which does not follow any standard design. It is essentially a long bar to which are secured, at regular intervals, 6 to 12 short lengths of chain. Along each chain are tied "mops" or bunches of string or twine. This outfit is slowly dragged over the bottom at the end of the dredge cable. The starfish become entangled in the mops and the unit is hauled up at intervals to remove the starfish by hand-picking or dipping the mop in a tank of water at about 150° F. Dredging can be used to clean uncultivated areas where the starfish population is very large. The Flower suction-dredge consists of a wide, funnel-shaped collector carried on wheels a short distance from the bottom. A large centrifugal suction pump discharges the material into a rotating screen which separates the larger solid material and dumps it on a conveyor. It has been reported that it is hard to obtain the desired selectivity of bottom material with this dredge and that operating costs are excessively high. Liming is an effective control method, as only a few particles are sufficient to kill a starfish by contact on the aboral surface. The chemical is only slightly soluble in water, is quite cheap, and is readily available. The major disadvantage is the difficulty in distributing the lime in the proper amounts over the desired areas.

For years, efforts have been made to find some use for the starfish. If a market were established, the oystermen would realize some reduction in the control costs. A market would encourage others to capture starfish and gain benefits from them, thereby reducing the over-all starfish population and greatly simplifying the control problem for the oystermen. At present, however, the production of starfish meal is not practicable. Further research should be directed toward development of methods for the separation of the amino acids of the protein of starfish for the production of high-priced products which might encourage the establishment of a separate fishery.

0.6

Although the average food technologist is not an expert on plant sanitation, often he must assume this responsibility. Being familiar with the laws and problems of sanitation, he can apply his knowledge to the problems involved in protecting foods during storage and processing.

The technologist in a small plant may perform all of these duties. He may also be called upon to interpret government regulations and investigate potential sources of materials.

Present day food technologists are college graduates trained in the chemical, bacteriological, and engineering aspects of food processing.

Of course the technician needs some equipment to carry on his work. The basic items, such as an analytical balance, microscope, and pH meter may cost anywhere from $1,000 to $2,500. Ingenuity can often devise the necessary laboratory operating equipment.

Salaries offered to food technologists range from $3,000 to $7,000, depending on type of degree. The small plant may not be in a position to offer the technologist as many salary, vacation, and sick leave benefits as the large industrial organization. However, placement with a small company may represent greater personal opportunity to the food technologist as the opportunities to advance to executive capacity are often greater in a small firm.

The money spent on the salary and equipment of a food technologist is offset by profits in the form of increased sales and reduced losses.

0.5 (Cross Reference: 3.8)

Hygiene plays a dominating role in preventing contamination of semi-preserved meat by pathogenic bacteria. Its importance is recognized since in almost all cases of contamination by Salmonella or Staphylococcal enterotoxin there is no production of gas or "hard swell" as an aid to the detection of their presence even when incubated for 24 - 48 hours at 37° C. The presence of these organisms is attributable to contamination by carriers or infected personnel handling the manufactured product. This contamination can be reduced to a large extent by having systematic medical examination of personnel including use of fecal culture to detect enteric pathogens, and by enforcing strict hygienic measures after using the lavatory.

1.2 NORWEGIAN HERRING FISHERY

Anonymous
Trade News 7, No. 9, 15 (March 1955)

The Norwegian winter and spring herring fishery is carried on each year from January to April off the shores of lower west Norway. The herring stocks return at this time from Atlantic waters to their spawning grounds in Norway's coastal waters. During January through March, Norwegian fishermen take in 70 to 80% by weight of their annual total catch of herring. A date is fixed each year in mid-February which distinguishes the spring fishery from winter operations. The winter herring has firmer milt and roe while the spring herring is a leaner type fish. The winter fish bring a better price.

The winter operations are carried on chiefly with gill nets and purse-seines. Drift nets and bottom nets are the type used in gill netting. Purse-seine fishing is carried on both in the open sea and in fjords by vessels of 80' - 120' with a 15 to 20 man crew. These vessels are similar to the type used in British Columbia. Auxiliary vessels are available at the fishing grounds to carry the catch of herring ashore.

As a result of increased mechanization, Norwegian purse-seine vessels and most drift net boats are now equipped with echo-sounders and radio-telephones. In this way news of herring concentrations can be communicated to the rest of the fleet.

The winter herring has a particularly high fat content which provides the raw material for Norway's 71 shore reduction plants and three floating factories. About 80% of the catch is reduced to meal and oil, and the remaining fish is salted in barrels or iced.

(over)

 ABSTRACTER: Lois Elgin

1.0149 FISHING IN THE CENTRAL MEDITERRANEAN

Bradford, Ernle
World Fishing 4, No. 3, 114-116 (March 1955)

The coasts of southern Italy, Sardinia, and Sicily teem with a multitude of small-boat fishermen operating boats ranging in size from dinghies to 30-foot rowing boats as family concerns. This type of fishing is not economical and the returns are meager, but the cost-of-living is low and thousands of persons are occupied who would otherwise be idle should the fishing methods become more modern.

There are also larger offshore vessels, including trawlers. These boats are roughly but strongly constructed of wood and usually carry steading sails. Many were fitted with German diesels during the war, and since then many Italian, British, and Swedish diesel units have been installed. Trawl winches are driven by rod, gear, and worm-drive off the main engines. Most of the offshore boats use block ice for preserving catches, but the more modern vessels have refrigeration plants. Crews on the offshore boats are large with 25-30 men per 40-foot boat.

Many coastal fishermen and their row boats are hauled by the deep-sea boats to areas offshore where they are dropped off to fish for short periods. Fish caught during these ventures are pooled and later divided equally.

Mazzara del Vallo is the most important fishing port in the central Mediterranean area. It is crowded the year around with 20- to 200- ton fishing craft of all shapes and sizes. The most steady demand for fish is created by the Italian market. Other steady markets are in Malta and Gozo.

(over)

 ABSTRACTER: M. R. Greenwood

1.0111 FISHERIES STATISTICS FOR BRITISH COLUMBIA (1954)

Anonymous
Western Fisheries 50, No. 2, 37-52 (May 1955)

The sockeye and halibut fisheries stood out as the most important factors in the British Columbia fishing industry in 1954. The sockeye run on the Adams River (the Fraser's biggest producer) was the largest in its history. Over half of B.C.'s 47-million pound haul of sockeye was contributed by the Adams catch. A record breaking 70-million pounds of halibut was produced by that tightly controlled fishery.

The market value of all British Columbia fish and fish products in 1954 was $71 million including $1.2 million worth of Japanese tuna. The $35 million fishermen's share was the third highest landed value on record. Of this $10.4 million was from sockeye and $5.5 million from chum salmon which had an unusually large early fall run.

The table on the reverse side gives the quantities and values of the most important species.

(over)

 ABSTRACTER: Kathryn L. Osterhaug

1.84 OFFSHORE AND NEWFOUNDLAND SCALLOP EXPLORATIONS

Dickie, L. M. and Chiasson, L. P. (Fisheries Research Board of Canada, St. Andrews, N.B.)
Fisheries Research Board of Canada, General Series Circular No. 25, 1 - 4 (March 1955)

To assess the prospects of developing an offshore scallop fishery on the banks of Nova Scotia and Newfoundland, the Fisheries Research Board of Canada started an investigation in 1953 with the plan of locating offshore scallop beds nearer home than Georges Bank.

Tows were made with commercial type (9 foot and 11 foot) drags. Loran was used to facilitate obtaining accurate positions. A Fisheries Research Board observer accompanied each exploratory cruise to record position, number of different sizes of scallops caught and weight of meats. In promising areas he collected samples of shells which indicated ages, sizes, and rate of growth of the scallops caught. All data were analyzed to determine the commercial potentialities of each area.

The Newfoundland Banks. -- One bed on the northern part of St. Pierre Bank, near the coast of Newfoundland, was found to yield the most profitable fishing. The bed, discovered in late 1953, was fished by several commercial boats during the spring and summer of 1954. The three high boats were estimated to have taken a total of more than 170,000 pounds of scallop meats by the end of June 1954. Nearly all scallops caught were the same age, indicating only a single successful spawning year. Although there seemed to be enough scallops on the bed to provide at least another year or two of commercial fishing, the bed will become valueless unless new sets of young occur. Scallops were found on other parts of St. Pierre Bank, but not in commercial quantities.

Green Bank was not fished. Not much of Grand Bank afforded suitable dragging bottom, and in areas where dragging was possible, only a few of the small Iceland scallops were taken.

(over)

 ABSTRACTER: M. R. Greenwood

1.0111

Quantities and Values of Most Important Species
1954

(in order of value)

Kind of Fish	Quantities Landed (000's Lbs.)	Landed Value $ (000's)	Marketed Value $ (000's)
Salmon	178,862	23,579	50,281
Herring	360,962	4,565	7,340
Halibut	25,200	3,984	5,965
Crabs and Shrimps	5,139	599	1,169
Soles	5,427	274	461
Clams	3,774	104	306
Ling Cod	3,907	309	487
Black Cod	1,128	137	257
Oysters	6,440	307	470
Gray Cod	4,972	212	467
Liver and Viscera	2,099	253	427
(1) Other Items	4,359	721	1,792

(1) Includes landed and marketed value of whales for which no quantity is available.

1.84

The Nova Scotian Banks. -- The most promising bed of scallops found off Nova Scotia was located on Brown's Bank. Large numbers of scallops were taken here, however, they averaged only three inches in diameter (70 meats/lb.) and hold no commercial possibilities as long as there are larger scallops available in other areas. There is also evidence of other age groups on this bed. The present abundant group are slow-growing and no old scallops or shells were found, indicating the bed is probably a poor producer. No other beds were found on Brown' Bank.

No scallops and poor dragging bottom prevailed during the exploration of the other western Nova Scotian Banks between Brown's Bank and Sable Island Bank.

Middle Ground has no commercial possibilities at the present time but warrants future investigation.

Sable Island Bank produced scallops. A bed southwest of the island yielded large old scallops at the rate of 5 bushels per 45-minute tow, but the meats were in such poor condition that a day's total landing would average only about 250 pounds. Fewer scallops were taken per 45-minute tow southeast of the island, but the meats were in such shape that 500 pounds per day could be caught. North of the island scallops were not abundant enough to produce commercial quantities.

Inshore Newfoundland Explorations. -- The best catches made on inshore grounds of Newfoundland were taken in 3 to 5 fathoms of water just southeast of Governor's Island in York Harbour. Dragging was difficult, however, because of thick kelp beds on the bottom. Other inshore areas revealed no commercial prospects.

1.2

Large stocks of herring, improved catching techniques, and a good market organization have helped increase the yield of the winter herring fishery. A well developed program of scientific research by private and state research organizations have also aided the industry.

NORWAY: WINTER HERRING FISHERY, BY MAIN UTILIZATION AND CLASSES, 1953 - '54 - '55
IN '000 POUNDS.

	From Opening of Season - 28/3/53 To		From Opening of Season - 28/3/54 To		From Opening of Season - 27/3/55 To	
Utilization	Total Large Herring	Total Spring Herring	Total Large Herring	Total Spring Herring	Total Large Herring	Total Spring Herring
Reduction	983,054	106,326	1,631,891	294,319	1,229.516	310,673
Exported Fresh	71,598	53,204	109,823	70,477	157,896	100,598
Salted	153,667	39,268	204,950	26,458	217,144	27,528
Canned	5,644	14,897	13,288	9,687	9,158	12,367
Bait	9,644	1,627	8,638	1,052	5,262	739
Domestic Fresh	8,827	2,433	7,497	1,785	9,763	1,630

NOTE: Classes: Large Herring - herring caught between January 20 (opening of season) and mid-February.
Spring Herring - herring caught between mid-February and the end of March or beginning of April (end of season).
Winter Herring - the total of Large and Spring Herring.

1.0149

Offshore boats work from Mazzara del Vallo south as far as North Africa, east towards Egypt, and west towards French North Africa. Some of the best grounds are found near the three islands of Pantellaria, Lampedusa, and Linosa. Only short periods are spent at sea because of the limited areas for fishing.

The principal fishes of the area are mackerel, whiting, red mullet, rockfish, and squid. Squid are valued the most and are caught at night in a dead-calm sea (fishermen use olive oil to still even small ripples). Fish are of poor quality with a sluggish "cotton wool" texture that may be due to the lack of tides in the Mediterranean. Dendice (like cod, but richer) and Lampuki are among those fish of the best quality. Red mullet abound and are cheap. Whiting command good prices. Large prawns, of the "Paris" or Dublin Bay variety, are of little value. Large crayfish in this region are commonly called and sold as "lobster". Flatfish are rare and expensive. Sardines are plentiful and are considered the best cheap fish. A large percentage of the sardine catch is canned and exported, but much of it is sold fresh on local markets. Octopus is popular in the area. They are caught off rocks by divers or by hook and line using a bait of some white material. Octopus has a rubbery texture but has a lobster-like flavor. Tunny is the most valuable fish. Swordfish are the next most valuable. Swordfish are caught in coastal waters west of Messina as they come in to spawn. Here tunny fishermen harpoon them from row boats directed by lookouts on larger boats. For generations, sections of this coastline have been allotted to family groups for swordfishing. Each group remains within its boundaries and catch the swordfish as they swim through their areas.

2.00 SPOILAGE OF HADDOCK IN THE TRAWLERS AT SEA: THE MEASUREMENT OF SPOILAGE AND STANDARDS OF QUALITY

Castell, C. H. and Triggs, Rosalie E. (Atlantic Fisheries Experimental Station, Halifax, Nova Scotia)
Journal of the Fisheries Research Board of Canada 12, No. 3, 329-341 (May 1955)

Eight hundred and fifty haddock caught in a series of 20 trips (between February and September 1953) to the Nova Scotian and Grand Banks were used in this study. The whole gutted fish were iced down in the hold of the vessel from 1 to 9 days and were filleted immediately after they were taken off the boat. Each fillet was examined for odor, color, and texture; and was graded as either "fresh" or "not fresh." The pH and trimethylamine values were determined and are shown in Figure 1 and Table II.

The data indicate a close correlation between the development of most early spoilage odors and an increase in trimethylamine. The pH of the homogenized muscle, however, is not a good indicator during the early stages of spoilage. One known exception is the type of spoilage known as "bilgy" fish; in this case spoilage was not accompanied by an increase in either trimethylamine or pH. The following standards are suggested for grading freshly cut haddock fillets: trimethylamine values of 0 to 1 milligram per 100 g. -- fresh; 1 to 5 milligrams -- doubtful or spoiling; above 5 milligrams -- spoiled.

(over)

 ABSTRACTER: D. T. Miyauchi

2.14 YOUR GUIDE TO ELECTRICAL FISHING, PART 1

Cattley, J. G. (Fisheries Laboratory, Lowestoft)
World Fishing 4, No. 3, 125 - 127 (March 1955)

The reactions of fish to an electrical current. -- Fish can perceive minute electrical currents in water. It takes additional power to affect their movement and still more to incapacitate them. As voltage of a current is increased from zero, any fish within the field will have three typical reactions at three definite stages during the increase. The first phase is a sudden jerk of the head often accompanied by increased activity of the gills and fins and occasional small changes in position. During the next phase the fish is strongly stimulated and swims rapidly towards the anode in a d. c. field or at random in an a. c. field. In the final phase the fish ceases voluntary movement, his opercula stop working, and he sinks toward the bottom lying on his side. If the conditions producing phase 3 are continued too long, the fish dies; but he can recover after short periods of this treatment. The recovery rate depends on the length of exposure.

Fish in an electrical field are least affected when they are lying with the longitudinal axis of their bodies at right angles to the flow of current. A German scientist discovered that definite voltage values produce each phase of the reactions mentioned above regardless of species or size of the fish.

Current density and electrical fields in water. -- The total current flowing through water will be distributed in the resistance evenly throughout its cross-sectional area. Thus, the current density for any cross-sectional area between the poles can be defined as so many amperes per square centimeter or square inch. The amount of resistance depends on the type of water (fresh, salt, clear, turbid) and the distance between the electrodes.

(over)

 ABSTRACTER: M. R. Greenwood

2.14 THE POUND NET FISHERY IN VIRGINIA, PART 1 HISTORY, GEAR DESCRIPTION, AND CATCH

Reid, George K. (Texas A. & M. College, College Station, Texas)
Commercial Fisheries Review 17, No. 5, 1 - 14 (May 1955)

The pound net is one of the most important fishing gears in Virginia. It lands the greatest weight of food fishes. Recent declines in the catch of croaker or hardhead, and gray sea trout or weakfish have created a need to study the fishes, the fishery, and its methods. The General Assembly of Virginia has provided funds to study proper mesh sizes and fixed fishing devices in the interest of conservation and a suitable catch.

A preliminary study was made in 1953 covering the historical aspects of the fishery, the present construction of the nets, and methods of fishing. A survey was made of the available records of the catch since 1920.

The introduction of pound nets in 1870 met with conflict by local fishermen. This method of fishing has since transformed the fisheries of Virginia from an industry of little importance to one of the most important shore fisheries in the U. S.

There have been few changes in construction and methods of operating pound nets in the last 30 or 40 years. Copper paint is commonly used during the summer months as a preservative while tar is used during the cooler weather. The spacing of the stakes which support the nets has been increased, resulting in savings on the cost of the supports. A continuous length of net has replaced the use of many single panels hung from stake to stake. A change to a refined funnel opening has also been made.

(over)

 ABSTRACTER: Lois Elgin

2.117 NEWLY DESIGNED OUTBOARD-POWERED OYSTER BOAT

Anonymous
Commercial Fisheries Review 17, No. 5, 33 - 34 (May 1955)

A specially designed 26-foot outboard-powered oyster boat will be featured in a fishery educational motion picture, Outboard Motor, being prepared by the Fish and Wildlife Service in cooperation with manufacturers of outboard motors. The vessel was developed during research on the film.

The boat will be useful for oystering and other commercial fishing activities. The craft is powered by a 25-h. p. motor which is located in a well in the stern. It will travel about 16 m. p. h. while unloaded. With its large foot beam, the boat has a large carrying capacity. There is a small house forward which provides shelter. The cost of the craft will be approximately $1,500 including the motor.

(over)

 ABSTRACTER: Lois Elgin

2.14

The variation in stated mesh sizes makes it advisable to appraise relative mesh sizes and legal sizes of fishes.

The basic construction of the pound net provides means for the entrapment of fish and a means of directing the fish into the structure. As seen by the illustration, a large bag of netting and a series of nets hung from poles in heart-shaped bays furnish the basic design. Most refinements consist of improved techniques for hanging the various nets for greater efficiency and economy. Adaptations have also been made to the bottom contours and currents in the area where the nets are used.

A crew of 5 or 6 men works the pound net once every 24 hours when fishing is good. Little change in method of working the nets has occurred since 1880. Alewife, menhaden (non-food component) shad, sea trout, and croaker are among the main species fished.

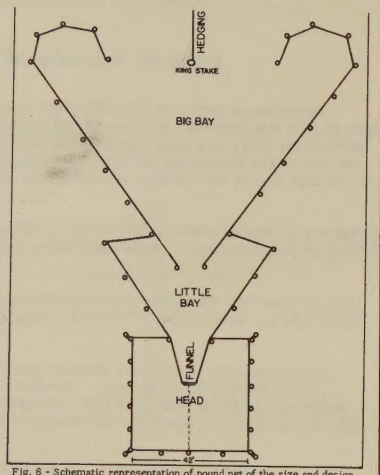

Fig. 6 - Schematic representation of pound net of the size and design used at present in the lower Chesapeake Bay. Based on personal observations and on dimensions given by local pound-net fishermen.

2.117

Stern view of outboard-powered oyster boat.

Side view of outboard-powered oyster boat.

2.00

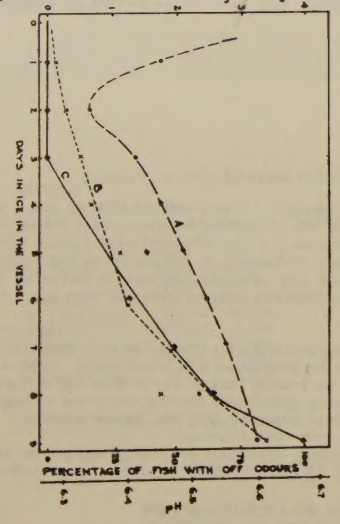

TABLE II. The percentage of fillets in increasing ranges of trimethylamine, from 850 haddock iced in the vessel for from 1 to 9 days at sea.

Days in ice	Percentage of fillets with trimethylamine values of					
	0–0.9	1.0–1.9	2.0–2.9	3.0–3.9	4.0–4.9	over 5
1	100	0	0	0	0	0
2	100	0	0	0	0	0
3	100	0	0	0	0	0
4	82	18	0	0	0	0
5	46	41	13	0	0	0
6	44	38	15	3	0	0
7	17	42	26	13.5	1.5	0
8	20	44.3	20	10	4.3	1.4
9	2	16	25	25	14	18
	fresh		spoiling			spoiled

(arbitrary standards of spoilage based on trimethylamine values)

2.14

In open water the current flow between two cylindrical electrodes resembles the lines of force illustrated in a magnetic field by dropping iron filings on a paper over a pair of opposite poles. Similarly, the electrical potential between two cylindrical electrodes in open water has the voltage gradient concentrated into the areas near each electrode with the vast majority of the space between the electrodes having practically no voltage gradient. High voltage gradients near the electrodes may be minimized by increasing the diameter of the electrodes and/or the use of more than one pair of electrodes.

Although the resistance between the electrodes will be increased the further they are moved apart, so will the total size of the electrical field. The current passing will not decrease appreciably when electrodes 10 or more meters apart are further separated.

2.114 NEW BOOM-TIP POWER BLOCK FOR SEINES SAVES TIME AND LABOR

Anonymous
Western Fisheries 50, No. 2, 32, 34 (May 1955)

A Seattle seine fisherman has invented and patented a powered block designed to be mounted on the tip of the boom on purse-seine vessels. The use of the power block enables a complete set to be made in half the time required of the normal strap-loading method.

The power block is a 500-pound steel block with a power-driven sheave. The seine is led through the block, held by molded cleats and fed down to the men on the turntable for piling.

According to observers, there also appears to be an advantage in saving on wear and tear on the web as well as the cork and lead lines. Strap holds are unnecessary. The block is also effective for herring and salmon seines.

A powerblock now in use in the United States is made of salt-water resistant aluminum alloy, and with a 28-inch sheave it weighs 150 pounds.

The block is driven by a rope belt off the power head of the seine winch, through four fair-leads on the block and around a wheel in the main sheave.

(over)

2.115 LIFE BOATS FOR YOUR VESSEL

Anonymous
Fishing Gazette 72, No. 5, 62, 69 (May 1955)

A lifeboat is a safety device, not just something to fulfill a regulation. The heavy and unmanageable steel lifeboat should have been made obsolete fifty years ago. Most lifeboat launching machinery is clumsy and impractical. Only Herculean supermen could launch them at sea in an emergency.

Wooden dories are superior to steel lifeboats because they are lighter than those made of steel and can be put over by hand if necessary. They also will float when filled with water providing something to cling to in dire circumstances. Wooden dories have proven to be about the safest boats ever built.

Launching apparatus should be easy to operate and foolproof. It should be located in a position where the listing of the vessel would not interfere with its operation and as close to the water as practical. The surest vantage point would be the stern.

Drawings A, B, and C illustrate a suggested lifeboat arrangement which is safe and easy to handle.

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2.1128 LOBSTER TRAP EXPERIMENTS

Anonymous
Trade News 7, No. 7, 10-11, 22 (January, 1955)

Losses of wooden lobster traps in the maritime provinces of Canada run as high as half a million a year. With the average value of these traps amounting to five dollars, it can be seen that this destruction represents a tremendous loss to the lobster fishing industry.

In an effort to find a more durable trap, the Fisheries Research Board has been experimenting with traps made of metal. For the most part the metal traps have been of conventional design, patterned after the wooden traps most popular in the experimental areas. Most of the metal traps tested have been constructed of quarter-inch steel rod welded to three-eighth-inch steel bows (or frames). In attempts to simplify construction, traps iron-framed and bolted, and covered with aluminum mesh are being tried. Some of the recent models are being strengthened with a framework base of three-quarter or one-inch angle iron.

Although the metal traps are considerably lighter in air than the conventional wooden traps, their weight in water makes them difficult to haul.

	Weight in Pounds	
	In Air	In Water
Soaked wooden traps with fixed stone ballast	109	29
Metal traps - model 1	52	46
Metal traps - model 2	56	50

(over)

2.3 FILLETING MACHINES SPEED PRODUCTION AND SAVE LABOR COSTS

Anonymous
Fishing Gazette 72, No. 5, 56-57 (May 1955)

The development of an industry consists, to a large extent, of the elimination of a series of bottlenecks. Each labor-saving machine has a tendency to create a demand for still another machine to keep up with the first. The end result of this development is full automation.

Filleting unit-- With the invention of a filleting unit, the fish processing industry advances another step toward completely automatic operation. The unit consits of a heading machine, a filleting machine, and two skinning machines equipped with nape cutting attachments. Two operators can produce about 52,800 pounds of nape-on fillets per day and four operators can handle the same production of skinless, nape-off fillets.

Power requirements-- The heading machine is powered with a 2.2 h.p. motor, the filleting machine with a 5.5 h.p. motor, and each skinning machine with a 2.2 h.p. motor.

Unit adjusts automatically-- The unit is designed to handle cod, haddock and similar species of ground fish. The machine's distributors emphasize that the unit eliminates the need for sorting the fish. The machine measures each fish and adjusts itself automatically to handle fish up to 40 inches in the large unit and fish from 12 to 24 inches in the smaller unit.

Skinning unit unique-- The skinner peels the fish instead of cutting the skin away from the flesh. This not only saves waste but leaves an iridescent membrane on the fillet which improves its appearance and makes it easier to handle.

BOOM-TIP POWER BLOCK

METAL LOBSTER TRAPS

CHOICE AND PLACEMENT OF LIFEBOATS

MECHANICAL HANDLING OF FISH

2.1128 (Cross Reference: 1.87)

To test the fishability of the metal traps as compared with the wooden traps, fishing trials were conducted in three separate areas. Results were as follows:

Port Maitland, N.S.

Period	No. of Trap Hauls	Number of Market Lobsters: Wooden Traps	Metal Traps: Model 1	Metal Traps: Model 2
Nov. 2/53-Jan. 14/54	264	351	345	
Jan. 16/54-Mar. 29/54	248	285	141	
March 24/54-May 28/54	473	326		234

Fourchu, N.S.

Period	No. of Trap Hauls	Number of Market Lobsters: Wooden Traps	Metal Traps Model 2
June 9-July 13/54	178	223	190

Miminegash, P.E.I.

Period	No. of Trap Hauls	Number of Legal Size Lobsters: Wooden Traps	Metal Traps Model 3
Aug. 10-Oct. 4/54	499	239	248

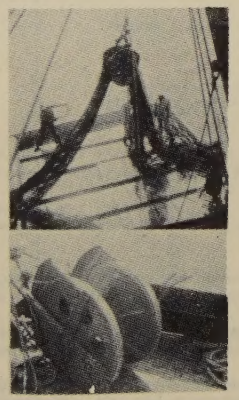
In the last experiment, in which metal traps caught 104 percent of the amount taken in the wooden traps, special precautions were taken in rigging and setting the metal traps to insure that they settled to the bottom right side up. In the earlier experiments there was evidence that the metal traps sometimes settled on their sides, and this undoubtedly contributed to their poorer catches.

During the tests, many of the wooden traps were destroyed or damaged by storms, whereas none of the metal traps were damaged.

Although results to date are encouraging, there are still some problems to be overcome. More must be known about the cost of metal traps and their life-expectancy in relation to their efficiency before they can be recommended for general use.

2.3

2.114



2.115

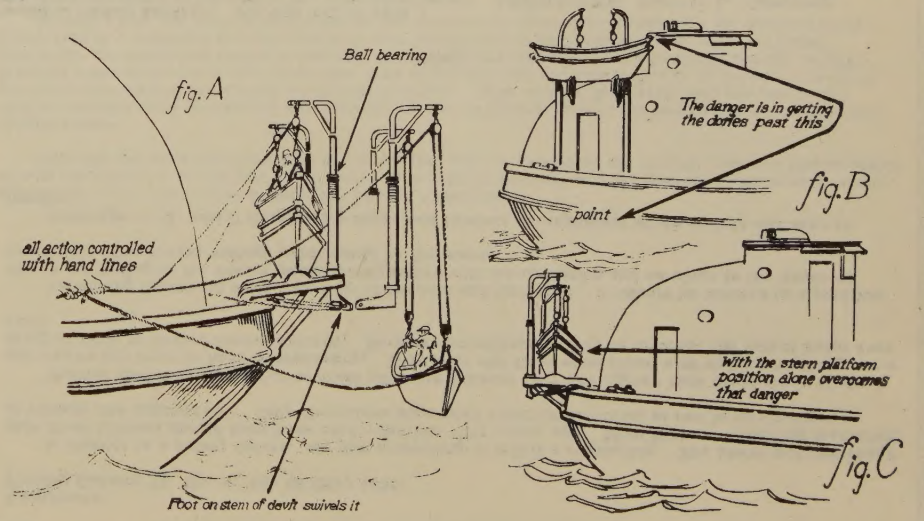


fig. A
Ball bearing
all action controlled with hand lines
Foot on stem of davit swivels it
The danger is in getting the dories past this point
fig. B
With the stern platform position alone overcomes that danger
fig. C

3.249 MAIN PROBLEMS OF FISH PROTEIN DENATURATION

Dyer, W. J. (Atlantic Fisheries Experimental Station, Halifax, Nova Scotia)
Symposium on cured and frozen fish technology, Swedish Institute for Food Preservation Research, Goteborg, No. 100, Chapter 7 (November 1953)

The deterioration of fish muscle on frozen storage as related to the historical development of the concept of muscle proteins is briefly discussed. Denaturation of fish-muscle protein is defined as "the initial process of change or disruption of the unique natural configuration leading to a more random structure, and is often followed by a process of aggregation or polymerization leading to insolubility." The criterion of denaturation used by the author was that of solubility. Other properties suggested for following protein denaturation were (1) availability of various groups, (2) streaming birefringence, (3) viscosity, (4) electrophoretic and ultracentrifugal patterns, and (5) biological properties.

Study of the protein fractions present in fish muscle (cod and halibut) showed that the actomyosin fraction, making up 70 percent or more of the muscle protein, becomes denatured as measured by extractibility in salt solutions. This denaturation is affected by various factors, species of fish, freshness of fish, rate of freezing, temperature and time of storage, etc.

Taste-panel studies on stored frozen fish muscle showed that two types of changes occur: (1) a toughening of the texture which parallels the denaturation of actomyosin, and (2) a development of off-flavors in the later storage stages which appears to be related to fat spoilage. A question proposed by the author concerned the possible relationship between the coincidental appearance of fat spoilage flavors and the last stages of the actomyosin denaturation. It was suggested that denaturation of the protein might liberate lipids from lipoproteins and render them more amenable to oxidation.

(over)

 ABSTRACTER: Harry L. Seagran

3.33 THE KITCHEN CONCEPT IN SEAFOOD CANNING

Anonymous
Pacific Fisherman 53, No. 7, 45-50 (June 1955)

A recently organized Seattle firm is producing canned oyster stew, cream of oyster soup and canned oysters for the consumer market and clam chowder and oyster stew base for the institutional market. The stew and chowder bases are packed in No. 5 cans, 46 oz. net. An institutional oyster stew pack in 8-oz. tins (211 x 304) is also included in their production.

The plant is well equipped throughout with equal attention being given to efficiency and sanitation. Stainless steel has been used for washers, graders and working surfaces as well as for all piping through which milk, nectar or prepared products are pumped. All valves and pumps are of stainless steel and of the take-down type for quick and complete cleaning.

In the preparation center are three large and eight small stainless steel, steam-jacketed kettles. All product cooking is done in a single room supplied with filtered forced-air ventilation.

The entire cooking cycle is handled automatically in two 4-car retorts equipped with an automatic retort control system.

Oyster stew -- Shucked, washed, and graded oysters in tinned, closed milk cans are received at the plant after an overnight truck trip from the oyster beds. They are held at 33° F. until needed for processing.

(over)

 ABSTRACTER: Kathryn L. Osterhaug

3.9 COLD STERILIZATION -- NO REVOLUTION YET

Greenleaf, C. A. (NCA Director of Research)
The Canner 120, No. 22, 21 (May 30, 1955)

Research on the sterilization of foods by radiation is proceeding on many fronts. Numerous problems remain to be solved before any drastic change in present methods of food preservation can be envisaged.

Heat processing destroys enzymes more readily than it does bacteria; radiation operates in reverse. In many foods inactivated enzymes will cause degenerative changes. The problem of working out a practical method of bacterial and enzyme destruction still remains unsolved.

Research on the radiation requirements for the destruction of clostridium botulinum in a number of typical foods is now commencing.

Another problem is the production of off-flavors and off-odors by radiation.

The toxicity effects of radiation still must be satisfactorily resolved.

People working in the field of cold sterilization are conservatively cautious about predicting the future. Most of the optimistic time estimates come from people outside of the field.

 ABSTRACTER: Max Patashnik

3.230 IMPROVEMENTS REQUIRED IN THE FREEZING, STORAGE AND DISTRIBUTION OF FROZEN FOODS

Finnegan, W. J. (Consulting Engineer, Los Angeles, Calif.)
Food Technology 9, No. 5, 259-260 (May 1955)

Certain unfavorable factors are associated with the current methods of handling, packaging, freezing, storing, and distributing frozen foods. These factors are as follows: (1) Distorted or damaged containers that are caused by the expansion of the foods during freezing. (2) Desiccation of the foods due to lack of appropriate packaging, freezing treatment, storage, handling, and transportation. (3) The accumulation of free snow in foods packaged prior to freezing and to a lesser degree in foods packaged after freezing.

Freezing Expansion. -- Most foods contain a large amount of water that expands when foods are frozen. This expansion may fracture or distort the container in which the food is frozen or break down and rupture the cellular structure of the food.

Desiccation. -- Foods at 70° F. that are subjected to air as a secondary heat transfer medium during freezing present a vapor pressure at saturation of 52.3 pounds per square foot. Air at 0° F. that is used for freezing presents a vapor pressure at saturation of only 2.67 pounds per square foot. This represents about 50 pounds per square foot of vapor pressure differential. As a result, moisture diffuses from the foods that are being frozen to the adjacent air that is being used as a freezing medium. Five other factors also contribute to the drying action to which foods are subjected during freezing. These are as follows: (a) the relative humidity of the air to which foods are subjected during freezing (the lower the relative humidity the greater will be the amount of drying), (b) the rise in air temperature as the air passes over the foods being frozen (the greater the temperature rise

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 ABSTRACTER: Martin Heerdt

PROTEIN DENATURATION STUDIES

RADIATION STERILIZATION

CANNED CHOWDERS AND STEWS

IMPROVING FROZEN FOOD QUALITY

3.9

3.230

the drier the air will become and the larger will be the amount of drying that occurs), (c) the ratio of food surface to volume or mass (the greater the heat transfer surface of the food with relation to its volume or mass, the greater will be the amount of drying), (d) unsuitable packaging (this is one of the major contributory causes for the lack of water-vapor retention within the frozen food package. Unsuitable packaging permits the acceleration of the drying action; causes a substantial loss in quality, vitamins, and weight; and facilitates enzymatic action, oxidation, rancidity, and the loss of color and flavor), (e) the length of time the foods are exposed to the conditions cited under (a), (b), (c), and (d) above (the longer the time in storage the greater will be the amount of food desiccation).

Other conditions which cause drying of frozen foods during storage, handling, and transportation are the relative humidity of the air in the storage room and the water-vapor pressure of this air in relation to the vapor pressure of the foods. Drying is also influenced by fluctuating temperatures.

Free Snow. -- The snow found in packaged and loosely wrapped frozen foods forms as a result of the excess water-vapor pressure differential caused by the numerous fluctuating temperatures to which the food has been subjected prior to purchase by the customer.

Producers of frozen foods not only absorb a substantial loss in saleable food weight due to drying, but also suffer a loss in the quality and appearance of these foods. Individually frozen peas, lima beans, berries, and diced carrots may lose 10 percent in weight due to drying during the freezing treatment. About four-fifths of this loss is avoidable. If only half of the avoidable (8 percent in weight) loss is considered at a wholesale price of 14 cents per pound and 5 tons of food are frozen per hour for 20 hours per day and 20 days per month, the monthly loss will amount to $28,000. A properly designed freezer, suitable for reducing this loss to less than 2 percent of the product weight, would cost only $42,000. Any producer with a high moisture loss during freezing can therefore afford to install a new freezer.

3.249 (Cross Reference: 0.33)

The changes occurring in isolated actomyosin systems are discussed briefly in regard to freezing and salting effects.

3.33

As required the oysters are drawn from the cold room and emptied into a stainless steel washer where they are washed and agitated by compressed air. The oysters are then graded for size and those of proper size for canning are removed.

The oysters for the stew are sliced into approximately uniform pieces by a set of circular knives, blanched and weighed into cans. Milk, which arrives at the plant by tank truck and held in refrigerated stainless steel tanks is pumped into a 600-gallon stainless-steel tank and blended with oyster nectar. The blended liquid is then pumped to the canning line where a 16-pocket machine fills the cans which have already received a standard quantity of oysters. The cans then pass beneath a piston filler that accurately meters melted butter into the cans. A steam-jet vacuum machine is used for sealing the cans.

Clam chowder -- Frozen shucked and dressed butter clams and frozen clam nectar are used in making clam chowder.

A cream chowder base is made in a steam-jacketed kettle. Clam nectar is used in the base which is adjusted to the proper consistency to keep the solid ingredients in suspension and is pumped through a finisher to insure smoothness.

After thawing the clams are thoroughly washed and then minced. Together with diced potatoes they are added to the chowder base in an agitating kettle and the finished hot chowder is then pumped to a gravity type 12-pocket can filler. The filled cans go directly to a double seamer as the heat of the chowder establishes satisfactory vacuum.

3.230 TESTS PROVE IMPROVED FROZEN FOOD FLAVOR ACHIEVED WITH MSG LASTS FOR A YEAR

Kearns, M. Patricia (Huron Milling Company, New York); Fagerson, Irving S. and Fellers, Carl R. (Food Technology Department, University of Massachusetts, Amherst)
Quick Frozen Foods 17, No. 11, 62, 63, 248 (June 1955)

Tests were conducted to determine the minimum amount of monosodium glutamate (MSG) necessary to improve the flavor of certain frozen prepared foods during a year's storage. The effect of storage on these foods was also studied.

Experimental Procedure. -- The products studied included clam chowder, codfish cakes, haddock fillets and ocean perch fillets. For the clam chowder and codfish cakes a sufficient amount of MSG to give the desired concentration, as listed below, was added during the cooking or mixing operations.

Amounts of MSG Added To Products

	Pct. by weight of added MSG			
Clam Chowder	0	0.125	0.20	0.25
Haddock Fillets	0	0.125	0.15	0.20
Codfish Cakes (Precooked)	0	0.125	0.15	0.20
Rosefish (Ocean Perch) Fillets	0	0.125	0.15	0.20

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 ABSTRACTER: Kathryn L. Osterhaug

3.338 AMERICAN CAN'S NEW RESEARCH CENTER

Anonymous
Canner 120, No. 24, 15 (June 13, 1955)

Research is the major factor in the development of any industry today. The recent opening of the American Can Company's two-million-dollar Research and Development Center at Barrington, Illinois is an outstanding example of this forward looking trend to meet changes that must come in container demands of the future. The United States uses 35 billion metal containers a year in which are packed some 1500 varieties of products. Even though the average food container today contains 99 percent steel and 1 percent tin, the problem of adequate tin supplies for the future is acute. It is with the fact in view that most of the world's tin resources are in the path of Communist aggression that the 140 scientific and technical personnel at Barrington will cope with the problem of the containers of tomorrow. A variety of raw materials will be called upon for their fabrication. Steel, steel chemically treated, aluminum, steel with aluminum coating and other alloys and plastics will all play a part in the future container which will free us from wartime shortages.

The time is running out when the packer can merely order so many tin containers of the particular size to fit his needs as he has so blithely done in the past. The future container must be tailored to meet the particular product for which it is to be used. To date no one material has been found that shows as much versatality as the tin coating. In addition to developing new container materials, other knotty problems go along with the search. The new containers must lend themselves to manufacture at today's high speeds and must be at least as economical as present day containers. The replacement of soldered seams must be considered as some body materials will not take solder. High-speed side seam welding shows promise of success. Another possibility is the cementing of side seams and some cements have been found superior to solder or welding. New organic coatings to improve quality and shelf life and the use of radiation and antibiotics to reduce or eliminate sterilization are all under study.

 ABSTRACTER: Lynne McKee

4.90 USE OF VITAMIN A IN FORMULA FEEDS ANALYZED

Wilgus, H. S. (Director of Research, Peter Hand Foundation)
Feedstuffs 27, No. 22, 18, 20, 22-24 (May 28, 1955)

Sources of Vitamin A. -- Vitamin A occurs in the animal body as vitamin A alcohol $C_{19}H_{27}CH_2OH$, but chiefly as the vitamin A acetate and palmitate esters. These three forms of vitamin A posess respectively, 3,333,000; 2,905,000; and 1,825,000 units of vitamin A per gram. All of these forms of vitamin A may be synthesized and all are rapidly destroyed by oxidation unless in an oil solution or other protective agent. The palmitate ester is the most stable.

Fish oils are among the most important natural sources of vitamin A. They contain as high as 600,000 units of vitamin A per gram. To produce vitamin A feeding oils for animals it is common practice to blend oils of various potencies or to include synthetic vitamin A in the blend. Both fish meals and liver meals also contain some vitamin A. Dry vitamin A preparations on the market may consist of a vitamin A oil on a dry carrier or dry vitamin A protected with a coating of hydrogenated fat, wax, gelatin, pectin, or a protein-starch combination. Vitamin A may also be derived by animals from the yellow-orange plant pigments, the carotenes and cryptoxanthin, which are converted in the animals intestinal wall into colorless vitamin A. Beta-carotene which is found in green plant tissue is capable of yielding 1,666,000 units of vitamin A per gram. One gram of cryptoxanthin from yellow corn is equal to 833,000 units of vitamin A. Cattle and swine are able to convert only 25 - 40 percent of the carotene and cryptoxanthin found in plant tissue into vitamin A.

Destruction of Vitamin A. -- In the isolated form, vitamin A, carotene, and cryptoxanthin are very rapidly destroyed by exposure to oxygen or air. In the naturally occurring form, however, such as in oil or alfalfa meal, destruction takes place at a relatively slow rate, due to the hindered exposure to

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 ABSTRACTER: Martin Heerdt

4.21 REACTIONS OF FATTY MATERIALS WITH OXYGEN XVII. SOME OBSERVATIONS OF THE SECONDARY PRODUCTS OF AUTOXIDATION OF METHYL OLEATE

Coleman, J. E., Knight, H. B., and Swern, Daniel (Eastern Regional Research Laboratory, Philadelphia, Pennsylvania)
Journal of the American Oil Chemists' Society 32, No. 3, 135-137 (March 1955)

The paper describes results obtained by examining fractions of an autoxidized methyl oleate obtained by urea complex separations. The results of this study permit (a) a reevaluation and reinterpretation of the analytical results on unfractionated methyl oleate previously reported, (b) a more reliable concept of the composition of autoxidized methyl oleate, (c) an understanding as to why methyl oleate cannot be directly autoxidized to a peroxide content in excess of about 35 - 40 percent, and (d) the development of a procedure for converting autoxidized methyl oleate (or oleic acid) to a relatively simple system having potential commercial value. Details of this last point are the subject of the following paper in the series.

Pure methyl oleate was autoxidized in the dark at 80° by passing a stream of oxygen through the ester. After 96 hours, the maximum content of peroxide (38 percent) had been passed and the material contained about 33-percent peroxide. This autoxidized material was treated with urea in methanol at room temperature. The precipitate was removed by filtration and from it 62 g. of oil were recovered. From the filtrate, 90 g. of pale-yellow oil were obtained. Other samples of methyl oleate autoxidized for shorter periods of time were also fractionated by the urea technique.

It was found that when the autoxidized methyl oleate contained not more than 15 percent peroxides, (short-time autoxidation) the urea treatment gave a clean cut separation, the non-peroxidic material precipitating as urea complexes and the peroxides remaining in solution. Peroxide concentrates

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 ABSTRACTER: W. N. Sumerwell

MSG FOR FROZEN FISH

VITAMIN A IN FORMULA FEEDS

CANNERY RESEARCH

AUTOXIDATION OF METHYL OLEATE

4.90 (Cross Reference: 6.19, 4.82)

oxygen and the occurrence of natural antioxidants. Vitamin A destruction by oxidation is accelerated by heat, light, moisture, minerals, unstable fats or oils, and surface exposure. Destruction is retarded by the presence of protective agents such as natural or added antioxidants and by relatively stable fats such as antioxidant-treated greases or tallows. According to the author, the commercial products protected with a combination coating are the most satisfactory under all practical conditions encountered in manufacturing premixes and feeds.

Vitamin A Assay. -- Products that posess high vitamin A potency can be assayed for vitamin A by the colorimetric method using antimony trichloride. In assaying stablized products it is necessary to consider the effect of the stabilizing or coating agent. Gelatin, pectin, protein-carborhydrate mixtures, and similar materials inhibit complete extraction of vitamin A by fat solvents. These cases require the use of modifications such as alkaline digestion. The antioxidant DPPD interferes with colorimetric assays for both carotene and vitamin A since it reacts with antimony trichloride.

Selecting a Source of Vitamin A. -- If a feed is to be used within two weeks after mixing, the loss of vitamin A oil in the feed will be so slight that an antioxidant protected vitamin A product is unnecessary. Feed that may be bought for use or sale over an indefinite period probably should carry a protected vitamin A. Full credit should be given to the vitamin A potency of the yellow corn and the dehydrated alfalfa that is used in commercial feeds. These two products, as well as forages and roughages, usually constitute the chief source of vitamin A for poultry. Minimum protection levels of vitamin A may be assured by including vitamin A oils or stabilized dry vitamin A in the feed. A choice between a vitamin A oil and a dry stable product depends primarily on costs. Dry protected vitamin A products generally provide more consistent resistance to destruction than vitamin A oils especially in high-moisture content feeds.

4.21 (Cross Reference: 4.5)

prepared in this manner contained about 90 percent peroxide. However, when autoxidation times were longer and the peroxide content of the methyl oleate had reached the maximum level, the maximum peroxide content which could be obtained from the filtrate after urea treatment was 70 percent. In the case of those samples autoxidized past the peak of peroxide content, urea treatment was unsatisfactory in that little concentration of peroxide was obtained.

In the case of autoxidation to a peroxide content of 15 percent, the urea-complexed fraction was found to be nearly pure unreacted methyl oleate. In the case of autoxidation for long periods of time, very little unoxidized methyl oleate was found in the urea-complex fraction. Instead the complexes were composed mainly of oxirane and carbonyl compounds. The filtrate consisted mainly of peroxide and hydroxyl compounds.

3.230 (Cross Reference: 3.235)

The desired levels for the fillets were obtained by preweighing quantities of MSG into capsules and dusting the contents of each capsule over both sides of a pound of fillets. For a more uniform distribution of the MSG the dusting was accomplished with an electrically-driven vibrator-screen device.

The fillets and codfish cakes were packaged in waxed folding cartons with waxed paper overwrap. The chowder was packaged in aluminum foil boxes with crimped-on cover.

All samples were frozen immediately after packaging and stored at—10° to 2° F. At stated time intervals sample packages were withdrawn and prepared according to the directions given below:

How Sample Packages Were Prepared

Product	Net Weight	Preparation
Clam Chowder	14 ounces	Add one pint of milk to contents and heat in covered double boiler over boiling water for 25 minutes.
Haddock Fillets	16 ounces	Bake in oven at 350° for 45 minutes
Rosefish Fillets	16 ounces	Bake in oven at 350° for 35 minutes
Codfish Cakes	12 ounces	Heat in oven for 20 minutes at 400° F.

Trained and experienced panel members rated each product on a 10-point scale. Products with the highest acceptability received the highest score.

Results. -- Optimum levels of added MSG as determined by palatability scores are presented below:

Product	Optimum level of added MSG in pct.
Clam Chowder	.125
Haddock Fillets	.20
Rosefish Fillets	.20
Codfish Cakes	.20

The results of this study indicate that by adding the proper amount of MSG the flavor of the products tested can be improved and that the improvement is still apparent after a year of frozen storage.

6.133 SOLVENT EXTRACTION OF FISH OFFAL

Arnold, L. K. and Arvidson, Jr., H. C. (Iowa State College, Ames, Iowa)
Journal of the American Oil Chemists' Society 32, No. 3, 163-166 (March 1955)

Laboratory Studies. -- Wet, cooked fish wastes that contained from 13- to 19- percent oil and 20- to 45-percent moisture were extracted in the laboratory with trichloroethylene. The cooked fish wastes had been prepared for extraction by passing them through a Universal No. 2 household food chopper fitted with a coarse cutter plate. The apparatus used for extraction consisted of a one-inch glass tube equipped with a heating jacket, which kept the bed of fish meal and the incoming solvent at a constant temperature. The overflow rate of the miscella was maintained at 10 milliliters per minute. Temperature of extraction, particle size, moisture content, and various wetting agents were investigated in the laboratory studies.

An increase in extraction temperature decreased the residual extractives by only a small amount mainly because the extraction solution was almost pure solvent, the physical properties of which are not influenced greatly by temperature. A reduction in particle size likewise decreased the residual extractives by only a small amount. An increase in the moisture content of the fish waste, especially if in excess of 20 percent, very noticeably increased the residual extractables owing to the failure of the trichloroethylene to wet the meal readily.

Of 11 different commercial wetting agents tried, some improved the extraction efficiency of fish waste which contained 45-percent moisture whereas others retarded extraction efficiency. The best wetting agent, an alkyl aryl sulfonate, improved extraction efficiency by as much as 76.4 to 91.6 percent.

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 ABSTRACTER: Martin Heerdt

6.14 INSECT PENETRATION OF FILMS

Gerhardt, Paul D. and Lindgren, David L. (University of California Experiment Station, Riverside)
Modern Packaging 28, No. 8, 216-219 (April 1955)

Single layer transparent plastic films and laminated plastic films are being used increasingly in the packaging of food products.

The penetration of packaged foods by insects is an important consideration in choosing a material in which to seal products that are attractive to insects. The ability of the insects to penetrate varies and depends upon the species, its life stage, type of film, thickness of material, and the effect of creases, scratches and folds on the material.

The species of insects used in the study included the following: the granary weevil, Sitophilus granarius (L.); the rice weevil, Sitophilus oryza (L.), the lesser grain borer, Rhyzopertha dominica (F.); the cadelle, Tenebroides mauritanicus (L.); the saw-toothed grain beetle, Oryzaephilus surinamensis (L.); the confused flour beetle, Tribolium confusum Duval; the drugstore beetle, Stegobium paniceum (L.); dermestid beetle, Trogoderma sternale Jayne; Mediterranean flour moth, Plodia interpunctella (Hbn.); and the German cockroach, Blattella germanica (L.).

Lard-can tests. -- In the lard-can tests, a large population of insects was established in a 50-pound capacity can with approximately 3 inches of the appropriate culture media in the bottom. A 4 1/2-inch screen-covered hole was made in the lid.

The packaging materials to be tested were made up into 3- by 5-inch bags, filled with walnut meats and then sealed according to standard commercial practice. Extra precautions were made to be sure the tops were tightly sealed. Two or three bags of each type were placed in each lard can and examined for insect penetration at weekly intervals. The tests took from 8 to 11 weeks. Packages were considered penetrated only if the insect actually chewed through the film.

A summary of the results of the lard-can test is given in Table I.

The Cup-test method is illustrated and explained in the accompanying photograph.

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 ABSTRACTER: Kathryn L. Osterhaug

6.3 SEAWEEDS - NUTRITIVE VALUE

Burt, A. W. A., Bartlett, S. and Rowland, S. J.
Journal of Dairy Research (Cambridge University Press, Bentley House, 200 Euston Road, London, N. W. 1), 21, No. 3, 299 (October 1954)

Seaweeds, Ascophyllum nodosum and Laminaria cloustoni were collected in spring 1953 and autumn 1952, respectively and milled to produce suitable meals. Oatfeed obtained as by-product of oatmeal industry was used as control. The chemical composition of the seaweed meals and oatfeed are given in the table below. The results are expressed as percent of dry matter.

Food	True Protein	Ether Extract	Fiber	N-free Extract	Ash	CaO	P_2O_5	NaCl
Ascophyllum nodosum meal	5.69	3.33	5.49	60.82	23.43	2.52	0.262	3.82
Laminaria cloustoni meal	8.32	0.66	8.70	52.75	25.91	2.63	0.590	11.91
Oatfeed meal	7.81	4.79	16.59	67.33	2.81	0.13	0.729	0.20

Ten percent Ascophyllum nodosum meal (Mixture A), 10 percent Laminaria cloustoni meal (Mixture B), and 8 3/4 percent oatfeed + 1 1/4 percent salt (Mixture C) were each mixed with 90 percent of the following: 15 percent barley meal, 31 1/4 percent maize germ meal, 5 percent rice meal, 5 percent molasses, 5 percent linseed cake, 10 percent decorticated cotton seed cake,

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(The above abstract appears in FAO World Fisheries Abstracts 6, No. 4, 47 (July-August 1955) and is reprinted here)
ABSTRACTER: G. N. Subba Rao

6.15 NEW TOOL FOR SOLVING WASTE DISPOSAL PROBLEMS

Dickinson, Jones (Vice-President, Sherwood Feed Mills, Inc.)
Food Processing 16, No. 4, 12 (April 1955)

Problem. -- In the waste waters of food plants occur colloidal, gelatinous, and other solids too fine to remove by screening. They are difficult to recover without elaborate chemical treatment and settling procedures. It has been possible to remove such solids from waste waters by centrifugal force in excess of 5000 times gravity. However, it has not been practical to carry out such centrifugal separation on a plant scale. A Baltimore firm received spent grains from breweries which they dried and sold as animal feeds. Before drying, the water was pressed from the grain. The water contained protein insolubles which were a waste-disposal problem, but potentially valuable for their nutrient content.

Batch operation of bowl centrifuges having sufficiently high gravitational force is inherently an expensive operation and not feasible for waste recovery operations. Continuous centrifuges as used in this country have not proven satisfactory for this type of material because in the liquid phase separator, the sludge or solids are discharged through a series of small-diameter nozzles (1 m/m to 2 m/m). A particle must be considerably smaller than the nozzle in order to be discharged continuously without blockage.

Since the solid particles vary so much stoppage of this liquid-phase separator is very common and for that reason uneconomical. Preparatory treatment of the wastes to make it suitable for recovery by the nozzle separators is often more costly than the actual cost of centrifuges.

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 ABSTRACTER: William Clegg

SOLVENT EXTRACTION OF FISH OFFAL

SEAWEED MEALS IN DAIRY FEED

PACKAGING MATERIALS vs. INSECTS

AUTOMATIC DESLUDGING CENTRIFUGE

6.3

15 percent decorticated groundnut cake, 2 1/2 percent dicalcium phosphate, 1 1/4 percent limestone flour. The mixtures were cubed. The chemical composition of the three mixtures was practically the same; the true protein, 16.22 to 16.86 percent; ether extract, 6.20 to 6.68 percent; nitrogen-free extractives, 49.69 to 50.96 percent; CaO, 1.60 to 2.22 percent; P_2O_5, 2.20, 2.33 percent.

Eighteen high-yielding Ayrshire cows, 12 of which were in the first two months of lactation and 6 in third and fourth months were used. The layout of the experiment was similar to that described by Cochran, Autrey and Cannon (Journal of Dairy Science, Vol. 24, p. 937, 1941). After an initial control of two weeks on normal rations, the cows were fed for three weeks with each experimental ration. A basal roughage ration consisting of 30 pounds (13.6 kg.) of marrowstem Kale and 18 pounds (8.16 kg.) of hay estimated to supply nutrients and for production of the first 1 1/2 Imp. gal. (6.82 l.) of milk were fed daily to each cow. The mixtures A, B and C were fed at the rate of 3 1/2 pounds/Imp. gal. (0.23 kg./l.) above the first 1 1/2 Imp. gal.

The results in brief are as follows: (1) there is no significant difference in the milk yields between seaweed meals and oatfeed + salt at 10 percent level; (2) there was no significant difference in the fat content of the milk though the milk produced on the oatfeed-salt mixture had a slightly but significantly higher solids-not-fat content than that on mixtures of seaweed meal; (3) the seaweed meals have a nutritive value not greater than that of a mixture of 7 parts oatfeed and 1 part salt, which has an estimated starch equivalent to only 39; (4) there is no evidence of the beneficial effects of the high vitamin and mineral contents of seaweeds on dairy cows.

In view of the relatively high cost, low palatability and low nutritive value of seaweed meals, their possible uses in feeding dairy cows, appear very limited.

6.15

Solution.-- A design new to this country, based on the continuous centrifuges for solids separation, has been applied to this waste recovery problem. The operation of its bowl seal and sludge-discharge mechanism is based on the following features: (1) the exterior periphery of the bowl has a series of large discharge slots provided for the purpose of sliding sludge from the inside of the bowl to the sludge chute, located beyond the exterior of the bowl; (2) during clarification of a product, these slots are kept closed with a ring valve which receives a hydrostatic upthrust from a small stream of water, remotely supplied by a fine jet (only 30 pounds water pressure is actually required); (3) the centrifugal force develops a final pressure of 1000 p.s.i. under the valve.

Split Second Desludging. -- Whenever the bowl has been filled with a heavy mastic sludge, this closing water supply is shut off by time-cycling, and an operating jet causes the water under the ring to be discharged. The sludge on the inside of the bowl reacts with a pressure of 650 - 700 p.s.i. against the shamfered inner surface of the ring valve, pushing it downward. At the same time, all sludge discharge slots open, and the sludge is thrown out of the bowl centrifugally. This requires only a fraction of a second.

Immediately following the desludging operation, the bowl is again closed with a stream of water under the ring valve. The feed supply is shut off for approximately 5 seconds during desludging. However, the centrifuge travels at full speed all the time.

The bowl can be desludged every 45 to 60 seconds. In other operations desludging is done every 45, 60 or 120 minutes. The actual viscosity of sludge or its moisture content can be changed quickly by increasing or decreasing the normal operating time between desludging operations.

By using an automatic timing device to control feed and desludge water with solenoid valves at predetermined intervals, the entire operation becomes completely automatic. Only periodic inspection is necessary.

Data on processing and capacities with evaluated results are given in detail.

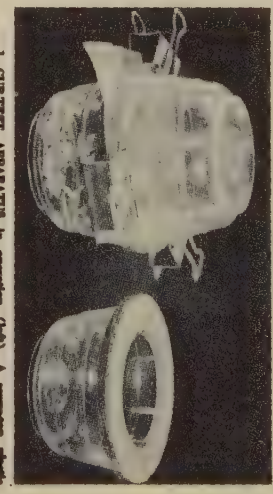
6.133

Pilot-plant studies. -- In these studies the fish meal was made (dried) from fish fins, fish scales, and fish flesh; whereas in the laboratory studies the waste was made from fish flesh with some bone and shell material. Prior to extraction, the dried fish meal was ground in a John Deere No. 10A hammer mill operated at 3,150 r.p.m. and fitted with a screen having 1/2-inch square openings. The Iowa State College extractor with trichloroethylene as the solvent was used in the pilot-plant studies. This extractor handles 5.4 pounds of fish meal per hour with an extraction time of 51.2 minutes and 14.4 pounds of fish meal per hour with an extraction time of 18.1 minutes. Data were collected to show the effects of miscella concentration, extraction temperature, and moisture upon solvent extraction efficiency.

An increase in the miscella concentration resulted in a small straight line increase in the residual extractables. Since the miscella was not controllable to exact concentrations, it was necessary to convert the data from other studies to a constant or 15-percent miscella concentration. The effect of time upon the residual extractables indicates that the extraction process is one of surface washing for short extractions and one of surface washing and diffusion for longer extractions. Increasing the extraction temperature resulted in a proportional decrease in the residual extractables. The effect of moisture on the residual extractables was greater in the pilot-plant extraction than in the laboratory extraction.

The best conditions for the extraction of fish meal with trichloroethylene, which yielded 1.27-percent residual extractables, were a 6.5-percent moisture meal, 15-percent miscella concentration, 130° F., and 38 minutes extraction time. Commercial hexane was not comparable to trichloroethylene as a solvent for oil in fish meal.

6.14 **(Cross Reference: 3.64)**



1. CUP-TEST APPARATUS in operation (left). A screw-top plastic cup (right) with 2-in. diameter hole in top and containing 50 adult insects of species to be tested was inverted over another containing appropriate food, with packaging film between, and the two clamped together.

TABLE 1.—PENETRATION OF VARIOUS PACKAGING FILMS BY ADULTS AND LARVAE OR NYMPHS OF 10 SPECIES OF COMMON STORED PRODUCT INSECTS IN "LARD-CAN TESTS".

Packaging film	Percentage of packages penetrated	Average No. of weeks required for penetration
Single-layer film:		
Cellophane		
300 MST, 0.0009 in. thick	76.5	3.0
450 MST, 0.0014 in. thick	73.7	3.0
600 MST, 0.0016 in. thick	78.4	3.8
Polyethylene		
0.0015 in. thick	60.5	2.9
0.002 in. thick	47.4	3.2
0.004 in. thick	13.1	3.0
Saran		
0.0015 in. thick	34.5	3.2
0.002 in. thick	35.1	3.9
Pliofilm, 0.0014 in. thick	37.3	5.5
Laminated film:		
Trilect, 0.0029 in. thick (two layers 300 MST cellophane with wax between)	34.2	2.8
K-302, 0.0014 in. thick (450 MST cellophane, with saran coating 0.00005 in. thick on each side)	55.3	3.8
Saran (0.0015 in. thick) plus Pliofilm (0.0012 in. thick)	13.8	5.5
Polyethylene (0.001 in. thick) plus aluminum foil (0.001 in. thick)	8.1	4.3
Pliofilm (0.0006 in. thick) plus aluminum foil (0.001 in. thick) plus acetate (0.001 in. thick)	0.0	

1 Total of 900 tests. (For description of "lard-can tests," see "Materials and Methods.")

7.51 RAPID METHOD FOR THE ROUTINE DETERMINATION OF CRUDE PROTEIN IN FISH MEALS

Stander, G. H. (Fishing Industry Research Institute, Portswood Road, Cape Town, South Africa)
Fishing Industry Research Institute, Progress Report No. 19, Cape Town, South Africa (February 1955)

The standard method for the estimation of crude protein is a slight modification of the Kjeldahl-Wilfarth-Gunning Method. A sample of approximately 2 gm. of fish meal is digested with 35 ml. concentrated sulphuric acid in the presence of 12 gm. potassium sulphate and 0.5 gm. $CuSO_4 . 5H_2O$. Boiling is continued for at least three hours after the mixture has become clear. Distillation is done in the conventional way.

Certain fish meals that are refractory require at least three hours of digestion after clearing when using the standard method. If mercury is used as a catalyst, the digestion time after clearing can be reduced to two hours. With copper as a catalyst, the digestion time after clearing can be cut down to 1 1/2 hours if the ratio of potassium sulphate to sulphuric acid is increased; that is, if the boiling point of the digestion mixture is increased. A loss of nitrogen results if selenium is used as a catalyst.

Perrin used relatively high proportions of potassium sulphate and mercuric oxide to sulphuric acid, and obtained a higher boiling point than is obtained by conventional methods. The results obtained when parallel tests were run to compare the standard method with the rapid method proposed by Perrin were as follows:

Perrin suggested various digestion mixtures that consisted of different ratios of acid to K_2SO_4 to the catalyst HgO. The proportions 2 grams meal, 25 milliliters H_2SO_4, 20 grams K_2SO_4 and

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 ABSTRACTER: Martin Heerdt

7.42 FLAME PHOTOMETRIC DETERMINATION OF CALCIUM IN SEA WATER AND MARINE ORGANISMS

Chow, Tsaihwa J. and Thompson, Thomas G. (Department of Oceanography, University of Washington, Seattle, Washington)
Analytical Chemistry 27, No. 6, 910-913 (June 1955)

A convenient flame photometric procedure was developed for the direct determination of calcium in sea water and marine organisms. The calcium emission intensity was measured at 422.7 mμ with a Beckman DU spectrophotometer fitted with the multiplier phototube and the modified flame attachments. The net light intensity was determined by correcting for the flame background intensity.

The factors which affected the intensity of the light emitted by calcium were determined. None of the major constituents of sea water (chloride, sodium, sulfate, magnesium, potassium, and strontium) showed any appreciable band-width interference. In addition, the effect of radiation interference on the calcium recovery because of the presence of the major constituents was determined. The presence of magnesium and sulfate ions greatly suppressed the calcium recovery as did chloride and potassium ions to a lesser degree. Sodium ions caused calcium to emit more light and therefore gave a high calcium recovery. Strontium ions did not interfere when present in quantities similar to that in sea water and in most marine organisms.

To eliminate the effect of interfering constituents, the "internal standards" technique was used in which movements of standard calcium chloride solution were added to a series of six portions of the unknown solution. The unknown calcium concentration was calculated from a graph in which the emission intensity was plotted against the calcium concentration of the standards added. The validity of the method was studied using known quantities of calcium added to synthetic calcium-free sea water.

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 ABSTRACTER: John A. Dassow

7.7 REPORT ON FISH AND OTHER MARINE PRODUCTS

Voth, Menno D. (Food and Drug Administration, Department of Health, Education, and Welfare, Seattle, Washington)
Journal of the Association of Official Agricultural Chemists 38, No. 2, 194-196 (May 1955)

The Referee has prepared revisions of methods 18.1-18.4 which will appear in the 8th edition of Official Methods of Analysis.

COMMENTS ON PROPOSED REVISION

Preliminary Treatment and Preparation of Sample. (18.1) (a) Fresh fish. -- This subsection has been rewritten for greater clarity and some of the directions have been made more general. The comminuting of samples by means of equipment such as the Waring blendor has also been given new status. (b) Canned fish and other canned marine products. -- The heading of this subsection has been made more inclusive. (c) Canned marine products packed in oil. -- The heading of this subsection has been made more inclusive. (d) Fish packed in salt or brine. -- This subsection has been moved from the end of section 18.1 in order to place it next to the other fish subsection. (e) Dried smoked or dried salt fish. -- This subsection was also moved forward ahead of the shellfish subsection. (f) Shellfish other than oysters, clams, and scallops. -- Only minor changes were made in the wording of this subsection. (g) Shell oysters, shell clams, and scallops. -- Only minor changes were made in the wording of this subsection. (h) Shucked oysters, clams, or scallops. -- This entire paragraph was moved and placed into a new section numbered 18.2 and entitled Volume Determination. That portion of the procedure in the Seventh Edition which directs that the liquid be separated from the oysters and analyzed separately in cases where the drained liquid is more than 10 percent has been entirely deleted. The use of the blendor in the preparation of oyster samples has made this portion of the

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7.53 RAPID DETERMINATION OF OIL IN FISH MEAL

Dreosti, G. M. and van der Merwe, R. P.
South African Shipping News and Fishing Industry Review (February 1955)

Introduction. -- A refractometric method for measuring the oil content of avocados has now been successfully adapted for the determination of oil in fish meal. The method is simple and rapid enough for use in the factory. Oil is extracted with a relatively non-volatile solvent, and the refractive index of the solution, which decreases as the concentration of oil increases, is measured. The selected solvent and the oil to be extracted must have different refractive indices to produce accurately measurable changes in the readings with changes in the amount of oil dissolved. About 15 minutes are required to carry out a determination.

Method I, extraction by grinding. -- A 5-gram sample of fish meal and 5 milliliters of monochlornaphthalene were used for each determination. The meal sample and solvent were brought together and the mixture was ground either in a mortar or by means of a 50-milliliter capacity oscillating metal cylinder containing two steel balls of 1-inch diameter.

Method II, extraction by heating. -- The meal and solvent mixture was placed in a 25-milliliter brass cylinder fitted with a vapor-tight threaded cap. The whole cylinder was then immersed in boiling water for varying periods of time, removed, inverted a few times, and cooled to room temperature in cold water. The cap was removed and the contents mixed with a stirring rod.

After extraction by grinding or heating, a portion of the mixture was poured onto a filter paper of high wet strength and a few drops of the liquid was expressed onto the refractometer prism. Several refractive-index readings were obtained at constant temperature for each sample. With proper care

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 ABSTRACTER: Martin Heerdt

7.7 (Cross References: 7.72, 7.74)

procedure obsolete. The last paragraph of this subsection with directions for preparing oyster samples has been deleted as obsolete for the same reason.

Volume Determination (Shucked Oysters, Clams, or Scallops) (18.2). -- As mentioned previously, the volume determination of shucked oysters, clams, or scallops was given a separate section.

Drained Liquid (Shucked Oysters (18.3) Apparatus. -- It was decided to change the wording specifying the perforations of the skimmer. Under the present directions which specify holes "at least one-fourth inch in diameter and not more than one and one-fourth inch apart," it would be possible to have holes an inch in diameter. The size of the holes and distance between them has consequently been limited. (18.4) Determination. A temperature at which the determination is to be made has been prescribed.

Total Solids--First Action (All Marine Products Except Raw Oysters). (18.5) The use of this method on raw oysters has not been sanctioned since a specified method is available for oysters. (Raw Oysters Only). (18.6) This section has been designated as applicable to oysters only since clams and scallops are better done by method 18.5. This section is available for those laboratories which do not have forced draft ovens. (Alternate Forced Draft Oven Method for Raw Oysters). (18.7) This method is the result of extensive work by associate Referee Traynor.

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a difference of not more than 0.0001 in the average readings on different aliquots of the same extract were obtained.

Results. -- Extraction by merely grinding the meal and solvent together was not entirely satisfactory. Extraction by heating the meal and solvent together was not only more convenient but also faster for all samples, including rock-lobster meal. Repeated tests showed that with meals having an oil content of 10 percent or less, extraction was complete after 5 minutes' heating. With meals of higher oil content up to 10 minutes' heating was required.

Refractive index versus fat content. -- A curve was drawn by plotting the refractive indices of extracts obtained with monochlornaphthalene, which had a refractive index of 1.6353 at 25° C., against values obtained by Soxhlet extraction of the same samples with hexane over a 15-hour period. A table that gave the percent of oil corresponding to each different refractometer reading was prepared from this curve. Reference to the table gives the oil content of the meal under test when the analysis is carried out at 25° C. with solvent of the specified refractive index. If these conditions are not met, the table can still be used if appropriate corrections for monochlornaphthalene and temperature are applied to the refractometer reading. Statistical analysis of the results of duplicate or triplicate determinations on samples of 35 different fish meals showed that the refractometric method is significantly more reproducible than the Soxhlet method.

7.51

1.5 grams HgO were selected. Vigorous frothing occurred during the initial stages of digestion with low ratios of acid to sample. Identical samples of fish meal were digested for periods of up to 60 minutes. The values obtained were compared with those obtained by the standard method. In this and all subsequent tests, the 500-watt heaters were left "full on" from the start of digestion. The results in table 1 show that a 15-minute digestion period gave almost complete recovery of nitrogen. For practical purposes, however, a 20-minute period is recommended. A slight tendency to lose nitrogen seems to result if the digestion period is extended to 60 minutes.

When using the standard method, the mixture became clear at about 340° C. With the rapid method, the electric heaters were allowed to warm up approximately one minute before the samples were put in place. A heating time of 0, 3, 6, 9, 12, and 15 minutes by the rapid method gave, respectively, a mixture temperature of 45°, 235°, 335°, 370°, 390°, and 395° C. Rapid digestion thus seems to result from the higher boiling point of the mixture and the increased catalytic effect obtained by using mercury instead of copper.

Parallel tests conducted on 55 samples of different meals showed that for both the rapid method and the standard method, duplicates agree on an average within 0.2-percent protein. With either method the maximum difference between duplicates was only 0.5-percent protein. When the results obtained by the rapid method and by the standard method were compared they agreed within 0.3 percent protein. In only two cases was there a difference of 0.4-percent protein.

Table I DIGESTION TIME vs. PROTEIN CONTENT

Digestion Time (minutes)	% Protein (N x 6.25) Sample A	Sample B	Sample C
5	44.4%	47.5%	47.8%
10	60.0	60.4	60.8
15	64.2	64.9	64.4
20	64.3	65.2	64.3
30	64.3	65.1	64.3
40	64.4	64.9	64.4
60	64.2	64.9	63.9
FIRI Method	64.4	65.1	64.3

7.42

Sea water samples from various depths to 5000 meters in the Gulf of Alaska were analyzed for calcium. A calcium-chlorinity ratio of 0.546 ± 0.002 was obtained when calcium was expressed in milligram-atoms. This agreed with previously reported values. The applicability of the method for the analysis of marine organisms, marine sediments, and limestone was demonstrated.

Table V. Calcium Content of Some Marine Organisms

Common Name	Scientific Name	Sources of Samples	Ca, %
Calcareous alga	Bossea orbigniana	Monterey, Calif.	29.3 ± 0.2
Calcareous alga	Corallina gracilis	Monterey, Calif.	26.2 ± 0.1
Foraminifer	Calcarina sp.	Ifalik Atoll	31.6 ± 0.2
Calcareous sponge	Rhabdodermella nuttingi	Monterey, Calif.	29.6 ± 0.2
Coral	Porites sp.	Ifalik Atoll	37.4 ± 0.2
Chiton	Mopalia muscosa	Friday Harbor, Wash.	37.7 ± 0.2
Oyster	Crassostrea virginica	Fort Stark, N.H.	33.7 ± 0.2
Abalone	Haliotis cracherodii	Monterey, Calif	39.2 ± 0.2
Snail	Oliva litterata	Marco Island, Fla.	39.6 ± 0.4
Barnacle	Balanus eburneus	Alligator Harbor, Fla.	36.6 ± 0.2
Crab	Cancer borealis	Fort Stark, N.H.	24.0 ± 0.2
Starfish	Asterias vulgaris	Marblehead Neck, Mass.	20.1 ± 0.1
Brittle starfish	Ophiura sarsi	Friday Harbor, Wash.	31.2 ± 0.3
Sea urchin	Heterocentrotus trigonarius	Ifalik Atoll	32.7 ± 0.1
Deep sea sediments		Indian Ocean[a]	29.9 ± 0.2
Globigerina ooze		Pacific Ocean	37.5 ± 0.3
Limestone deposit		Roche Harbor, Wash.	38.1 ± 0.2

[a]Swedish deep sea expedition, 1947-48.

9.11 OCEANOGRAPHIC SURVEY OF THE NORTH PACIFIC OCEAN

Anonymous
Science 121, No. 3153, 794 (June 3, 1955)

Canada, Japan, and the United States will join forces this August to conduct an oceanographic survey of the North Pacific Ocean from North America to Japan and from the Tropic of Cancer almost to the Bering Strait. Plans for Operation NORPAC, as the program is called, were announced by Roger R. Revelle, director of the University of California's Scripps Institution of Oceanography, during the recent annual meeting of the American Geophysical Union.

The results are to serve as a background for studies of fisheries problems of all three countries, and to provide data for exhaustive research in the various fields of oceanography: physical, biological, chemical, meteorologic, and geologic. The ocean area to be covered comprises more than 10 million square miles, or about one-sixteenth of the earth's surface. At least 20 fully equipped oceanographic research vessels will be engaged in a simultaneous survey of the region. They will sail a total of about 70,000 miles.

In terms of ships, manpower, and area covered, this will be the largest oceanographic program ever conducted. And in none of the previous large oceanographic cruises have the measurements been taken in a short enough time to avoid inclusion of seasonal changes in the ocean currents in the measurements. Previous cruises have covered large areas but have required more than a year to complete.

NORPAC has been more than a year in the making. Three United States agencies are involved: the California Cooperative Oceanic Fisheries Investigations, using the vessels of the Scripps

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9.11 VERTICAL DISTRIBUTION OF ZOOPLANKTON IN THE CENTRAL EQUATORIAL PACIFIC

Hida, Thomas S. and King, Joseph E. (Fishery Aid and Fishery Research Biologist, Pacific Oceanic Fishery Investigation)
Special Scientific Report: Fisheries No. 144 (April 1955)

Detailed information is given on the method used for determining the sampling depth. Figures and tables are included to show the errors made in estimating depth by assuming that the tow wire described a straight line. Variation in ocean currents made the use of a continuous depth recorder very desirable. Using horizontal closing-net hauls with Clarke-Bumpus samplers, 68 samples were collected at the following depths: the surface, the level of the 70° isotherm, and at approximately 200 meters. The sample area included 30 stations in a series along 150° longitude from 12° to 7° latitude. The greatest concentration of zooplankton was found within the sampling area of 2° to 8° latitude; the maximum abundance being at 1° latitude. No significant difference in species composition was noted when samples were analyzed from stations in the north and south equatorial currents.

The surface samples were found to have a greater volume and number of organisms than the samples taken at the intermediate and deep levels. The most abundant group of organisms present were the copepods, followed by the foraminifers, eggs, tunicates, gastropods, chaetognaths, radiolarians, crustacean larvae, ostracods, euphausiids, siphonophores, and amphipods in that order. No evidence was found to support the theory that zooplankton was concentrated in the region of the thermocline. It was found that the average size of the organisms increased with the sampling depth; the size being greater in the night collections with the exception of the deep level, where the opposite was found to be true.

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 ABSTRACTER: Robert Doll

8.53 UBER DEN FETT- UND WASSERGEHALT IM HERRING
(FAT AND WATER CONTENT OF HERRING)

Brandes, C. H. (Institute of Marine Research, Bremerhaven, Germany)
Symposium on cured and frozen fish technology, Swedish Institute for Food Preservation Research, Goteborg, No. 100, Chapter 12 (November 1953)

Analyses for fat content of herring were carried out on sections of the two fillets of a single fish as shown in figure 1 and table 1. The numbered sections in figure 1 are for one fillet. The opposite fillet has corresponding numbers (e.g. 1 corresponding to 4 and 2 to 3). The Roman numerals correspond to cross sections which were also analyzed for fat, protein, ash, and moisture. For another single herring, the percent fat content for sections I to VI (VI is an additional terminal tail section) were 24.2, 27.4, 23.9, 21.0 and 17.2. The percent protein content for section I to VI were 14.5, 15.1, 15.7, 16.0, 16.4, 17.0. The percent ash values were 1.20, 1.16, 1.10, 1.11, and 1.16. Moisture percentages were 60.1, 57.6, 58.1, 59.8, 61.6, and 65.2. Figure 2 shows the relationship between moisture and fat content of herring. The correlation coefficient was found to be 0.974, sufficiently high to make possible a calculation of the fat content if the moisture content is known. This water-fat relationship is better correlated when moisture is determined by drying at 60° C. in a vacuum oven than by air drying near 100° C. It is shown that using data published in Commercial Fisheries Review for fat and moisture content of certain species, a good and similar correlation exists for sheepshead and whitefish but not for smelt and rosefish.

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 ABSTRACTER: M. E. Stansby

8.8 WHAT FDA LOOKS FOR IN MAKING A PLANT SANITATION INSPECTION

Holmes, Edward L. (American Sanitation Institute, St. Louis, Missouri)
Canner 120, No. 22, 11 - 13 (May 30, 1955)

In making a cannery sanitation inspection, the Food and Drug Administration considers every plant an individual problem; however, they consider the major sources of contamination as follows, in order of importance:

1. Human behavior that involves lack of proper personal hygiene, improper attire, and inadequate supervision.
2. Rats, mice, and other vermin.
3. Flies, roaches, water bugs, and other insects.
4. Dirty equipment and utensils.
5. Raw materials, water, and ice supplies in an improper condition.
6. Insanitary toilets and washing facilities -- also their accessibility.
7. General plant structure, including surroundings, plant construction in relation to rodents and insects exclusion, general cleanliness, and cleanability.
8. Waste disposal, dealing principally with methods of sewage disposal from the plant and other buildings in immediate surroundings, wherever this is of significance.
9. Storing and handling -- in particular -- of such products within the plant that are subject to insect and rodent infestation.

The FDA inspectors are provided with forms that are submitted to the management of the cannery to be inspected. These forms provide for naming the recipient and states that an inspection is to be made. The inspector identifies himself to this person, presents his official credentials, and explains

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 ABSTRACTER: D. T. Miyauchi

NORTH PACIFIC OCEANOGRAPHIC SURVEY

FAT CONTENT OF HERRING

DISTRIBUTION OF ZOOPLANKTON

PLANT SANITATION INSPECTION

8.53 (Cross References: 8.51, 8.4, 8.43, 1.2, 7.53, 7.43)

Figure I
Sample numbering system for herring fillet.

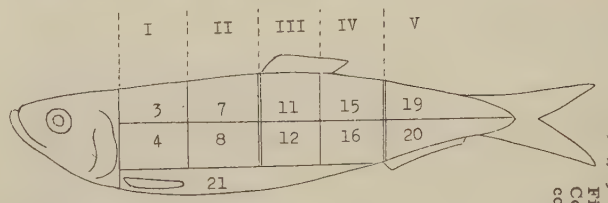

Table I Oil Content of One Herring

Cross Section No.	Piece No. and Fat Content (%)
I	1 - 23.2; 2 - 26.2; 3 - 27.9; 4 - 25.1
II	5 - 27.0; 6 - 31.6; 7 - 30.3; 8 - 27.6
III	9 - 24.1; 10 - 25.6; 11 - 26.6; 12 - 26.9
IV	13 - 20.8; 14 - 21.4; 15 - 21.7; 16 - 22.3
V	17 - 17.2; 18 - 16.5; 19 - 14.4; 20 - 17.8
Belly Flap	21 - 47.4

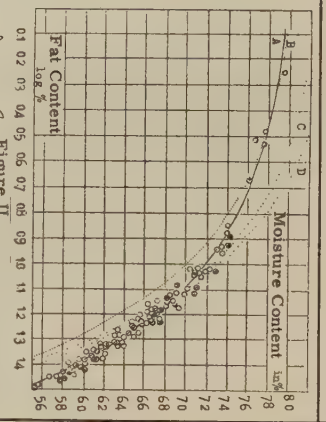

Figure II
Correlation of fat and moisture content of herring. (Curve A).

8.8

the purpose of his visit as follows: " (1) to inspect the plant; (2) to examine the raw material; (3) to follow through on the manufacturing processes; (4) to check labels and labelings; (5) to check the finished products; (6) to determine how the finished products are distributed; (7) and possibly to collect investigational samples."

The inspectors are instructed to look for evidence of rodent infestation and any other sources of contamination, to determine the path of contamination from the source to the product, and to evaluate its effect on the finished product. The inspector is required to inform the management of all evidences of sanitation violation but not on other types of violation. The evidences are recorded on-the-spot, and a copy promptly sent to the inspector's supervisor. The inspector gives a receipt to the management for any samples collected; a written report of any laboratory analysis is sent to the management.

9.11

Institution and the South Pacific Fishery Investigations of the U.S. Fish and Wildlife Service; the department of Oceanography of the University of Washington; and the Hawaii-based Pacific Oceanic Fisheries Investigations of the U.S. Fish and Wildlife Service. The Canadian agency is the Pacific Oceanographic Group, Nanaimo, B.C. The cooperating Japanese agencies are the Nagasaki Marine Observatory, the Kobe Marine Observatory, the Hakodate Marine Observatory, the Japanese Hydrographic Office, the University of Kokkaido, the Tokai Regional Fisheries Research Laboratory, the University of Fisheries, Tokyo, and the Central Meteorological Observatory.

Joseph L. Reid, Jr., oceanographer at Scripps who has worked as coordinator of the various plans, stated:

> "The most significant feature of the program is that for the first time we will be able to view the entire North Pacific current pattern without any disturbances due to seasonal changes, which have made our previous pictures so difficult to understand."

9.11

An analysis of variation in samples collected at night and during the day showed that night samples were significantly greater in volume at the surface level ($P < 0.01$). At the intermediate and deep levels the day collections were greater in volume, however the differences were not statistically significant.

A comparison was made with another sampling method previously used in the same area. Small Copepoda, Foraminifera and Appendicularia were retained in large numbers by the Clarke-Bumpus samplers equipped with 56XXX grit gauze net, while they passed through the coarser meshes of 1-meter nets of 30XXX grit gauze. There was no great difference in the volume of catch per unit of water strained by the two types of gear, indicating that the loss in small organisms by the larger net was compensated for by the less successful dodging of larger organisms.

Pertinent tables and figures are included with the report.

1.2 THE NORWEGIAN WINTER HERRING FISHERY I.

Egenaes, W. Nitter
Norwegian Fishing News 2, No. 2, 12 - 13 (March 1955)

The winter herring fishery has once more shown itself as the largest among the various Norwegian fisheries. This year's catch amounted to 950,268 metric tons, which is second only to last year's, when 1,092,230 metric tons were produced.

The winter herring fishery assumed considerable commercial significance some time before the Viking Age (800-1050). During the Viking Age the main type of gear employed in fishing for herring was the gill net and the land seine, and air drying was the only method of preservation in use. Dried herring also were the only form of export until the replacement of expensive home-produced salt with imported salt during the 17th and 18th century. In 1699, the city of Bergen exported 13,500 barrels of cured herring, whereas in 1751 they exported 112,000 barrels. From the 18th century, until steamboats and railways revolutionized all transportation, salting was the chief method of preservation.

A golden period of winter herring fishing had its beginning in 1808. Trade was brisk and salted winter herring became a substantial Norwegian article of export. An increasing number of fishermen and boats took part in the herring fishery, which in the most productive seasons yielded total catches of 50,000 to 90,000 tons. The fishing gear, however, remained the same as it had been for centuries. Winter herring were caught inshore from open, combined sailing and rowing boats on grounds among the outer skerries, along the outer islands, and in the bays penetrating the coastline. In the period before spawning, the gill nets were set, fastened ashore, or anchored afloat; during spawning time, the nets were set on the sea bed. Land seines were used when the herring came into the bays. Several joined land seines sometimes were employed as a fence where the herring were held until

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 ABSTRACTER: Martin Heerdt

3.249 DENATURATION OF PROTEINS OF EGG WHITE AND OF FISH AND ITS RELATION TO THE LIBERATION OF SULFHYDRYL GROUPS ON FROZEN STORAGE

Husaini, Saeed Ahmad and Alm, Frithiof
Food Research 2, No. 3, 264-272 (May-June 1955)

An investigation was conducted initially on the white of eggs to find out if a relationship existed between the "masked" sulfhydryl groups and the freezing denaturation of the proteins of egg white as measured by the decrease in the amount of soluble nitrogen. The term "masked" sulfhydryl groups was used to indicate the difference between the total content of sulfhydryl groups of proteins as determined after the addition of a denaturing agent, and the amount of free available sulfhydryl groups.

Egg white was frozen and stored at -5°, -10°, -15°, and -20° C. A separate lot was also stored at 0° C. (unfrozen). Water-soluble nitrogen and sulfhydryl groups both before and after denaturation of proteins were determined at various intervals of the storage period.

The number of "masked" sulfhydryl groups available in egg white showed a sharp decrease and reached a minimum value after 28 days' storage, thereafter an increase occurred until a storage time of 48 days had elapsed. After 48 days, the "masked" sulfhydryl groups became more or less constant, with the exception of those samples stored at 0° C. which showed a gradual decline. The higher the storage temperature the greater was the decrease in the amount of "masked" sulfhydryl groups during the first 28 days.

At storage temperatures of 0°, -5°, -10°, and -20° C. the value of water soluble nitrogen in egg whites showed a slight decrease during the first 11 days of storage; increased, and reached a maximum

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 ABSTRACTER: Robert Doll

4.92 FISH OIL -- NUTRITIONAL STATUS OF UNSAPONIFIABLE FRACTION

Anonymous
Food Manufacture 30, No. 5, 207-208 (May 1955)

Marine animal oil glycerides contain large quantities of polyethylene fatty acids of a particular molecular structure. The physiological effect of these polyethylene fatty acids, which are not found in land animal oil glycerides, is being investigated by the French Fisheries Research Institute.

Human beings, in contrast to most domestic animals, can consume rather large quantities of fish oil without injury. In animals, however, an excessive intake of fish or whale oil causes a vitamin E deficiency that may result in death. This phenomenon can be explained by the fact that human beings consume either the unsaponifiable fraction of marine animal oils that is rich in vitamin A and D and is of unquestionable nutritional value or the saponifiable fraction after it has been hydrogenated. In short, human beings do not consume oils that contain large amounts of polyethylene fatty acids. Those oils with a high vitamin content, especially the hydrogenated oils are of high nutritional value.

 ABSTRACTER: Martin Heerdt

3.33 EFFECT OF REDUCTION OF BACTERIAL LOAD DUE TO PREVIOUS EXPOSURE TO HEAT DURING THE THERMAL PROCESS ON LETHAL RATES AND LETHALITY

Hurwicz, H. and Tischer, R. G. (Quartermaster Food and Container Institute for Armed Forces, Chicago, Illinois)
Food Research 20, No. 3, 226 (May-June 1955)

Biglow and others in developing the "general method" of determing a thermal process did not take into account the reduction of a bacterial load at successive temperatures due to the effects of previous exposure to heat. Thus, the time necessary to reduce the decreasing magnitude of bacterial populations at successively increasing temperatures is overestimated as the thermal process goes on. The result is an underestimate of sterilizing value of the total process. This consideration has not been taken into account up to the present time in process evaluation although it could have a large effect on recommended process times. The investigation of actual thermo-bacteriological relationships to be used in ascertaining the sterilizing values of the thermal process would correct the methods of estimate.

The fundamental difference between the two methods lies in the fact that the effect of previous exposure of bacteria to heat is recognized in the proposed method as resulting in a progressive reduction of bacterial load exposed to the thermal process at succeeding time intervals. The proposed method may also be adapted to the modern methods of estimate of lethality for the whole volume of the container. The two methods are similar in that use is made of either graphical integration with a planimeter or a summation procedure. Formula and graphs for both methods are shown.

 ABSTRACTER: Lynne McKee

NORWEGIAN HERRING FISHERY

NUTRITIVE VALUE OF FISH OIL

PROTEIN DENATURATION

BACTERIAL LOAD AND THERMAL PROCESS

4.92

3.33

1.2 (Cross Reference: 1.0141)

needed. A single enclosure might contain 5,000 or more tons of herring. Gill nets as well as the land seines proved to be very effective types of gear when the herring were seeking the spawning grounds or rushing against the shore.

During the dark period, 1874-1883, when the herring shoals kept away from the fishing grounds, the merchants reported large shoals of herring on the open sea where the fishermen with their shore-bound types of gear could not reach them. The fishermen attempted to use their traditional gill nets (made of hemp) at sea as drifting nets. The results were, however, insignificant.

The first successful steam-fishing enterprise was operated in Norway in 1885. The Norwegian fishermen became interested in fishing at sea from decked boats. Sailing vessels that were built and used in long-lining soon proved their capability in herring fishing but not before the drift-net method was adapted. Drift-net fishing for winter herring was started by the Norwegians in the 1890's, whereas purse-seine fishing was used in the winter herring fishery for the first time in 1905. Another event important to Norwegian fishing occurred in 1903, when the first internal combustion engine was installed in a fishing boat. Gradually, the herring fishery has been mechanized through a series of technical inventions.

3.249

after 28 days, and then gradually began to fall. At -15° C. the water-soluble nitrogen rose slightly during the first six days of storage and then exhibited the pattern of the other storage temperatures.

The effect of temperature was not so pronounced in the case of water soluble nitrogen as it was on the value of "masked" sulfhydryl groups. Statistical analysis of the data indicated practically no correlation between the amount of "masked" sulfhydryl groups and water-soluble nitrogen in egg whites at any of the storage temperatures.

The second part of the investigation was conducted on fresh cod fillets which were frozen and stored at -4°, -6°, and -20° C. A separate lot was frozen rapidly at -60° and stored at -20° C. At all the storage temperatures "masked" sulfhydryl groups reached a minimum value after 50 days' storage, and then rose in a manner similar to that of the egg white "masked" sulfhydryl groups. As in the case of the egg whites, the higher the storage temperature, the lower the minimum value.

During the first 21 days of storage at -4° and -6° C. there was a sharp decrease in the amount of soluble nitrogen in cod muscle, reaching a value of about 40 percent (of the total nitrogen) and then gradually declining during the rest of the storage period. In the case of storage at -20° C. (both slow and quick frozen), soluble nitrogen fell to about 70 percent during the first 21 days of storage, after which it rose slightly and then commenced to decline.

Statistical analysis of the duplicate samples of the cod fillets showed no significant correlation between "masked" sulfhydryl groups and soluble nitrogen at any of the storage temperatures.

1.87 LOBSTER INVESTIGATIONS AT LONG BEACH POND, NOVA SCOTIA

Knight, A. P. (Queen's University, Kingston, Ontario)
Contributions to Canadian Biology (Supplement to the 7th Annual Report of the Department of the Naval Service, Fisheries Branch), 53-71 (1918)

1.87 CONTRIBUTIONS TO THE PHYSIOLOGY OF THE AMERICAN LOBSTER

Miller, F. R. (University of Toronto)
Contributions to Canadian Biology, 277-280, (1912)

1.87 THE LOBSTER FISHERY OF THE SOUTHERN GULF OF ST. LAWRENCE

Wilder, D. G.
Fisheries Research Board of Canada, General Series Circular, No. 24 (June 1954)

1.89 ANALYSIS AND COMPOSITION OF SOME MOLLUSK SHELLS

Bruni, Giodano and Trombara, Carlo
Chimica (Milan) 3, 91-3 (1948)
Chemical Abstracts 43, No. 14, 5506 (1949)

1.89 STUDIES ON THE COMPLETE UTILIZATION OF SQUID VIII, STUDIES ON THE REFRIGERATION OF SQUID MEAT FOR USE AS THE MATERIAL OF STEAMED MEAT JELLIES (KAMABOKO)

Tanikawa, Eiichi; Konno, Tetsuro and Akiba, Susumu
Bulletion of the Faculty of Fisheries, Hokkaido University 4, No. 3, 224 (November 1953)

1.89 STUDIES ON THE COMPLETE UTILIZATION OF SQUID IX, STUDIES ON THE MANUFACTURE OF "SURUME" (DRIED SQUID) (2) THE CHEMICAL COMPOSITION OF WHITE-FLOUR ON THE SURFACE OF "SURUME"

Tanikawa, Eiichi; Kudo, Shunichi and Motohiro, Terushige
Bulletin of the Faculty of Fisheries, Hokkaido University 4, No. 3, 234 (November 1953)

1.92 A STUDY OF THE CISCOES OF LAKE ERIE

Clemens, Wilbert A. (University of Toronto)
Contributions to Canadian Biology, 3 - 12, 73 - 85 (1922)

1.92 AN ANNOTATED LIST OF A COLLECTION OF FISHES MADE BY FRANCIS HARPER IN THE ATHABASKA REGION IN 1920, TO WHICH IS APPENDED A LIST OF SPECIES COLLECTED BY R. T. MORRIS IN THE DISTRICT BETWEEN LAKE WINNIPEG AND HUDSON BAY IN 1905

Kendall, William Converse (Roosevelt Wild Life Forest Experiment Station, Syracuse, New York)
Contributions to Canadian Biology (New Series), 19 - 25 (1924)

1.92 THE BACTERIOLOGY OF FRESH-WATER FISH

Venkataraman, R. and Sreenivasan, A.
India Journal of Medical Research 41, No. 4, 385 - 392 (October 1953)

(Abstract of this article appears under 0.5 page 1 - August 1954 issue)

2.00 RISKS IN THE PRODUCTION OF COALFISH PRODUCTS I & II

Biegler, P.
Fischw, - u. Feinkostind, 26, 77 - 92 (1954)
Food Science Abstracts 27, No. 3, 269 (May 1955)

The "lardy" condition in coalfish may be due to faulty salting techniques, but other factors such as temperature or pH of the flesh also appear to be concerned. There may also be purely biological reasons for the occurrence of "lardiness." Such fish are safe for consumption. The bleaching of the fish can be prevented by insuring a correct Pebea number, pH value, and vinegar content, by the use of fresh raw material, and by the addition of a suitable preservative. Fish must be packed in lacquered containers. The amount of water in the preserved product should be kept at a minimum.

2.00 IMPROVEMENT IN QUALITY OF ICED FISH

Anonymous
Report of the Food Investigation Board (Great Britain) for the year 1953, 25 - 26 (1954)

(Abstract of this article appears under 7.80 page 11 - July 1955)

2.00 TECHNIQUES OF FREEZING AND STORING FISH AND SEAFOOD

Butler, Charles
Frosted Food Field XX, No. 3, 80 - 82 (March 1955)

(Abstract of this article appears under 3.230 page 5 - July 1955)

3.234 THE PROTAN PROCESS FOR THE FREEZING OF FISH

Helgerud, O.
Kaltetech. 6, 190 - 193 (1954)
Food Science Abstracts 27, No. 3, 268 (May 1955)

Alginates made with added salts and dilute lactic acid were used experimentally in the block-freezing of herring. The alginate gel exerted a protective action; the separation of the fish was facilitated; and the tendency to stick on thawing was eliminated. Even after storage for a year, the herring were quite suitable for curing.

3.234 KEEPING FISH FRESH BY FREEZING AND GLAZING

Oppert, G.
Kaltetech. 6, 274 - 278 (1954)
Food Science Abstracts 27, No. 3, 268 (May 1955)

Fish were frozen individually or in blocks at 25° C. for 1 1/2 to 6 hours; removed from the containers, and glazed by dipping in clean, cold water. The optimum conditions, for dipping to form a glaze, were 15 seconds at -10° C.; for practical purposes, the number of dips is 1 to 3, and the dipping time 4 to 12 seconds.

3.249 THE INFLUENCE OF FREEZING AND FREEZER STORAGE ON THE APYRASE ACTIVITY OF FISH AND BEEF MUSCULATURE

Partmann, W.
Z. Lebensm. -Untersuch. u. -Forsch. 99, 341 - 6 (1954)
Chemical Abstracts 49, No. 3, 1986 (1955)

Samples of fresh gastrocnemius muscle of beef and body side muscle of tench were frozen, respectively, at -18° in air, -76° in MeOH-CO_2 bath, and at -190° in liquid air. A sample of the fish muscle was also frozen at -5° and held at -2 to -10°. A definite decrease in apyrase activity occurred in the fish stored at -2 to 10° for one month, which was attributed to bacterial action involving protein or fat changes, but not on freezing denaturation effects.

3.249 REFRIGERATION OF TUNA AND SARDINES BY SODIUM CHLORIDE BRINES

Farber, Lionel
Food Technology 9, No. 3, 141 - 147 (March 1955)

(Abstract of this article appears under 2.15 page 19 - May 1955)

3.249 THE FREEZING AND COLD STORAGE OF HERRINGS

Banks, A.
Proc. Inst. Refrig (London) 41, 109 - 227 (1944-45)
Chemical Abstracts 44, No. 11, 5028 (1950)

3.30 THE RELATION BETWEEN THE FRESHNESS DEGREE OF RAW SAURY (COLOLABIS SAIRA (BREVOORT) AND THE QUALITIES OF CANNED TOMATO-SAUCED SAURY

Tanikawa, Eiichi and Yaki, Tadao
Bulletin of the Faculty of Fisheries, Hokkaido University 5, No. 2, 209 (August 1954)

"The lowest limit of the freshness degree of saury meat as the suitable raw material for canned saury was about 20 mg. percent of volatile base nitrogen. When saury is stored at 15° C. and 20° C. steam sterilization of the meat must be started within 21 and 12 hours, respectively."

3.30 PRESERVING FISH AND MEAT IN CANS

Dutch Patent 69, 185 (December 15, 1951)
Chemical Abstracts 46, No. 15, 7250 (1952)

3.30 STUDIES ON THE MANUFACTURE OF CANNED MACKEREL VII. THE RELATION BETWEEN THE FRESHNESS DEGREE OF RAW (SCOMBER JAPONICUS HOUTTUYN) MEAT AND THE QUALITY OF CANNED BOILED MACKEREL

Tanikawa, Eiichi and Yagi, Tadao
Bulletin of the Faculty of Fisheries, Hokkaido University 5, No. 2, 153 (August 1954)

Raw mackerel meat of which the amount of volatile base nitrogen is estimated as 20 mg. percent is no longer fit material for preparing canned mackerel. When the storing temperature is 20° C., the maximum limit time of storing of mackerel meat will be 15 hours.

3.33 PREVENTING FORMATION OF STRUVITE IN CANNED COOKED FISH AND SHELLFISH

Kreidl, Ekkehard L. and McFee, Earl P. (to Gorton-Pew Fisheries Co., Ltd.)
U.S. patent 2,555,236 (May 29, 1951)
Chemical Abstracts 45, No. 14, 6319 (July 25, 1951)

3.33 CANNING SEAFOOD AND RESULTANT PRODUCT

McFee, Earl P. and Peters, John A. (to Gorton-Pew Fisheries Co., Ltd.)
U.S. patent 2,554,625 (May 29, 1951)
Chemical Abstracts 45, No. 18, 8166 (September 25, 1951)

3.33 PREPARING SHARK MEAT FOR CANNING

Mader, Perry W. and Mader, Gerstle I. (to Food Research Institute, Inc.)
U. S. patent 2,564,487 (August 14, 1951)
Chemical Abstracts 46, No. 1, 196 (January 10, 1952)

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Bulletin of the Japanese Society of Scientific Fisheries
California Fish and Game
Canadian Fisherman
Canadian Journal of Chemistry
Canadian Journal of Technology
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Commercial Fisheries Review
Drug and Cosmetic Industry
FAO Fisheries Bulletin
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Food Preservation Quarterly
Food Processing
Food Research
Food Science Abstracts
Food Technology
Frosted Food Field
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Industrial Refrigeration
Journal of Agricultural and Food Chemistry
Journal of Applied Chemistry
Journal of Biological Chemistry
Journal of Home Economics
Journal of Nutrition
Journal of the American Chemical Society
Journal of the American Dietetic Association
Journal of the American Oil Chemists' Society
Journal of the Association of Official Agricultural Chemists
Journal of the Fisheries Research Board of Canada
Journal of the Science of Food and Agriculture
Maine Coast Fisherman
Meldinger Fra SSF (Herring Industry, Norway)
Modern Packaging
Modern Refrigeration
National Fisherman
National Provisioner
Nature
Nutrition Reviews
Pacific Fisherman
Pan American Fisherman
Poultry Science
Practical Home Economics
Progressive Fish-Culturist
Quick Frozen Foods
Refrigerating Engineering
Report of the Food Investigation Board (Great Britain)
Science
Southern Fisherman
Trade News (Fisheries Department, Canada)
Western Fisheries
World Fishing

Articles chosen for abstracting or inclusion as bibliographical references are those deemed of interest to the commercial fisheries and to fishery technological laboratories. Occasionally pertinent articles from sources other than the above listed publications are included. Biological papers are generally omitted.

3.33 IMPROVING THE TASTE OF CANNED FISH

Mathiesen, Erling
U. S. patent 2,461,651 (February 19, 1949)
Chemical Abstracts 43, No. 9, 3540 (1949)

3.33 STUDIES ON THE MANUFACTURE OF CANNED CRAB. PART I. ON THE MANUFACTURE OF CANNED CRAB FROM ERIMACRUS ISENBECKII (BRANDT) PART 4. STUDIES ON B. COLI IN CANNING WATER

Tanikawa, Eiichi; Motohiro, Terushige; and Abe, Shinji
Bulletin of the Faculty of Fisheries, Hokkaido University 4, No. 2, 128 - 131 (August 1953)

"After heating such as at the stages of exhausting or sterilization, no B. coli were found in the meat. No coli-bacillus invaded the canned meat through the seaming even in the cooling water which contained coli-bacillus after processing."

3.33 INVESTIGATION OF FACTORS INFLUENCING FOOD STERILIZATION AND PRESERVATION

Lund, Arnold J.
Annual Report of the Hormel Institute, University of Minnesota, 74 - 78 (1953-54)

Spores of PA 3679 suspended in ether extracts of spoiled meat had a lower heat resistance than spores suspended in extracts of fresh meat. The selective concentrating of spores into the interface between chloroform and water is noted.

3.5 ENZYMIC ACCELERATION DURING THE MATURING OF GREEK SALTED AND PRESSED SMALL FISH

Kelaiditis, George C.
Prakt. Hellenic Hydrobiol. Inst. 3, No. 2, 29 - 39 (1949)
Chemical Abstracts 49, No. 8, 5715 (1955)

3.5 SODIUM PHOSPHATE CRYSTALS FOUND IN MILD-CURED SALMON

Amano, K.
Bulletin of the Japanese Society of Scientific Fisheries 15, 368-41 (1950)
Chemical Abstracts 49, No. 5, 3436 (1955)

An occurrence of Na phosphate ($Na_2HPO_4 \cdot 12H_2O$) in mild-cured salmon is described.

3.5 STUDIES ON PUTREFACTION OF AQUATIC PRODUCTS. X. ON PUTREFACTION OF SALTED AND DRIED FISH

Simidu, Wataru and Tihara, Itaru
Bulletin of the Japanese Society of Scientific Fisheries 20, No. 1, 30 (1954) (S & FS)

3.9 BACTERIOLOGICAL STUDIES OF SHIOKARA OR "SOUSED SQUID"

Nagao, Kiyoshi
Bulletin of the Faculty of Fisheries, Hokkaido University 5, No. 1, 47 - 72 (May 1954)

7. On the proteolytic enzymes of bacteria. Part II. On the activator of the proteolytic enzyme of Bacillus subtilis (continued)

8. On the metabolism of arginine by the intact cells of Bacillus subtilis. The intact cells of Bac. subtilis were able to accumulate arginine.

3.9 THE MANUFACTURE OF GYOMISO (FERMENTED FISH PASTE)

Tanikawa, E.; Akiba, M.; and Akiba, S.
Bulletin of the Japanese Society of Scientific Fisheries 15, 689-91 (1950)
Chemical Abstracts 49, No. 5, 3434 (1955)

I. Experiments on the manufacture of Gyomiso

II. The chemical changes of fish-meat protein during the ripening of Gyomiso

III. Relation between the amount of salt added and ripening velocity and the creation of ammonia during the ripening of Gyomiso

IV. Change of fat during the ripening of Gyomiso

4.11 SEPARATION OF FATTY ACIDS BY CHROMATOGRAPHY

Boldingh, J.
Intern Colloquium Biochem. Problem. Lipiden, 64 - 81 (1953)
Chemical Abstracts 49, No. 3, 2097 (1955)

B. uses a rubber powder as the carrier for the immobile liquid phase, and this method encompasses a range of the even satd. fatty acids from C_6 to C_{22}. By using a mixt. of acetone and water and neutral peanut oil as the mobile phase, the fatty acids can be eluted from the column, and by changing the compn. of this phase, the individual fatty acids can be obtained in succession at concns. which can be quantitatively titrated. This method uses a 16 - 17 cm. column.

4.11 STUDIES ON NATURAL FATS. VIII. FULLY SATURATED GLYCERIDE CONTENTS OF NATURAL FATS

Kartha, A. R. S.
Journal of Science and Industrial Research, India 12A, 405-9 (1953)
Food Science Abstracts 26, No. 3, 277 (May 1954)

An improved method for the determination of glycerides in natural fats by crystallization, a simple method of calculating the fully saturated glyceride content from the saturated acid content, and the difference in the melting points of the fats and their mixed fatty acids is given.

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6.190 THE NEW ENERGY-PROTEIN RATIO APPROACH FOR POULTRY FEED FORMULATION

Combs, G. F.
Feedstuffs 27, No. 29, 50 (July 16, 1955)

The results of studies at the University of Maryland with broilers indicate that a ratio of approximately 42 calories of productive energy per pound of ration for each percent protein is satisfactory for broiler starting rations. Broiler-finishing rations should contain approximately 48 - 50 calories of productive energy per pound for each percent of crude protein in the ration.

6.190 HIGH-FAT, HIGH-PROTEIN BROILER RATION

Anonymous
Feedstuffs 27, No. 6, 1, 79 (February 5, 1955)

(Abstract of this article appears under 4.82 page 11 - May 1955)

6.190 FISH PRODUCTS IN FEEDS. FISH PRODUCTS IN POULTRY NUTRITION

Combs, G. F.
Feedstuffs 26, No. 33, 53 (August 14, 1954)

6.3 THE SEASONAL VARIATION IN THE COMBINED L-FUCOSE CONTENT OF THE COMMON BRITISH LAMINARIACEAE AND FUCACEAE

Black, W. A. P. (Institute of Seaweed Research, Inveresk, Midlothian)
Journal of the Science of Food and Agriculture 5, No. 9, 445-448 (September 1954)

In the Laminariaceae, L-fucose is at a minimum in March and April and accumulates as photosynthesis proceeds in much the same way as mannitol. In the Fucaceae, L-fucose shows no regular seasonal variation on the dry basis, whereas on the wet basis, marked seasonal variations occur mainly because of the uptake of water by the plant before sporing.

6.3 BIOCHEMICAL STUDIES ON THE MARINE ALGAE. II & III

Togasawa, Yoshihisa and Mine, Taizo
Bulletin of the Japanese Society of Scientific Fisheries 20, No. 3, 189-195 (1954)

"The chemical constituents of Alaria crassifolia Kjellm. were studies comparatively in blades and spopophylls. As to the qualitative and quantitative tests of sugars in the sporophyll and blade Undaria distans Miyabe et Okamura and Alaria crassifolia Kjellm. were comparatively studied."

6.3 ON THE VISCOSITY OF SOLUBLE ALGINATE SOLUTIONS

Oguro, Miki
Bulletin of the Faculty of Fisheries, Hokkaido University 5, No. 3, 277 (November 1954)

The author investigated the colloid behavior of soluble alginate solutions of sodium, potassium, and magnesium prepared from Laminaria augustata.

6.3 SOUTH AFRICAN SEAWEEDS: SEASONAL VARIATIONS IN THE CHEMICAL COMPOSITION OF PHAEOPHYCEAE

von Holdt, M. M.; Ligthelm, S. P.; and Nunn, J. R.
Journal of the Science of Food and Agriculture 6, No. 4, 193 (April 1955)

Seasonal variations in the main constituents of Ecklonia maxima, Laminaria pallida and Bifurcaria brassicaeformis, which grow in abundance around the Cape Penninsula were recorded for ash, alginic acid and mannitol, whereas laminarin, combined fucose and organic nitrogen showed only small changes.

6.3 SULPHATED DERIVATIVES OF LAMINARIN

O'Neill, A. N.
Canadian Journal of Chemistry 33, No. 6, 1097 (June 1955)

6.3 THE DEGRADATION OF CARRAGEENIN. II. INFLUENCE OF FURTHER VARIABLES

Masson, C. R.; Santry, D.; and Caines, G. W.
Canadian Journal of Chemistry 33, No. 6, 1088 (June 1955)

7.522 COUNTERCURRENT SEPARATION OF PROTAMINES

Rauen, H. M.; Stamm, W.; and Felix, K.
Hoppe-Seyler's Z. physiol. Chem. 292, 101-9 (1953)
Chemical Abstracts 49, No. 10, 7037 (1955)

The sulfates or chlorides of clupeine, salmine, and iridine were shown to be inhomogeneous when subjected to countercurrent sepn. in a system consisting of 15 percent aq. NaOAc and 5 percent lauric acid in BuOH.

7.522 STRUCTURE OF PROTAMINE. IV. FRACTIONATION OF CLUPEINE

Waldschmidt-Leitz, Ernst and Voh, Rudolf
Hoppe-Seyler's Z. physiol. Chem. 298, 257-67 (1954)
Chemical Abstracts 49, No. 6, 4045 (1955)

7.522 THE NITROGENOUS EXTRACTIVES FROM FRESH FISH MUSCLE. III. COMPARISON OF SEVERAL FLAT FISHES AND MEMBERS OF THE HERRING-MACKEREL GROUP

Shewan, J. M.
Journal of the Science of Food and Agriculture 6, No. 2, 99-104 (February 1955)

(Abstract of this article appears under 8.51 page 13 - August 1955)

7.53 DETERMINATION OF FAT IN FOODS

Francois, M. Th.
Bull. mens. ITERG 3, 357-9 (1949)
Chemical Abstracts 44, No. 4, 1618 (1950)

A critical surview of (a) the Gerber method for the detn. of fat and (b) the methods employing solvent extn.

7.53 A MODIFIED LIQUID-LIQUID EXTRACTOR FOR ROUTINE OIL ANALYSIS

Buerki, Charles R. and Holt, Kenneth E.
Journal of the American Oil Chemists' Society 31, No. 8, 335-338 (August 1954)

7.53 DETERMINATION OF THE FAT CONTENTS IN EDIBLE PARTS OF HERRING BY CORRELATION OF FAT AND WATER

Brandes, C. H. and Dietrich, R.
Veroffentl. Inst. Meeresforsch. Bremerhaven 2, 122-34 (1953)
Chemical Abstracts 48, No. 22, 14024 (1954)

As there is a fixed relation between fat and H_2O content in the edible parts of herring a quick method for the detn. of fat is developed by detg. the H_2O content (3 hrs. at 60° in vacuo).

7.81 THE NITROGENOUS EXTRACTIVES FROM FRESH FISH MUSCLE. III. COMPARISON OF SEVERAL FLAT FISHES AND MEMBERS OF THE HERRING-MACKEREL GROUP

Shewan, J. M.
Journal of the Science of Food and Agriculture 6, No. 2, 99-104 (February 1955)

(Abstract of this article appears under 8.51 page 13 - August 1955)

7.81 EVALUATING THE STATE OF SPOILAGE OF FRESH AND PRESERVED FISHES

Buffa, Aldo and Ambanelli, Giorgio
Industria conserve 29, 185-9 (1954)
Chemical Abstracts 49, No. 8, 5714 (1955)

7.81 CHEMICAL STUDIES ON THE SUBSTANCE OF FISH SMELL

Obata, Y.; Tamanishi; and Ishida, M.
Bulletin of the Japanese Society of Scientific Fisheries 15, 551-3 (1950)
Chemical Abstracts 49, No. 5, 3434 (1955)

II. Pyridine-group compounds as the substances concerned with fishy smell

III. Investigation of the components of mucilaginous substances of salmon

7.89 A SIMPLIFIED TEST ON THE FRESHNESS OF FISH MEAT. V. EFFECT OF FRESHNESS OF FISH MEAT ON THE STABILITY OF ITS AQUEOUS EXTRACT AGAINST ALCOHOL

Amano, K. and Tomiya, F.
Bulletin of the Japanese Society of Scientific Fisheries 15, 753-8 (1950)
Chemical Abstracts 49, No. 5, 3433 (1955)

The stability of water-sol. protein of fish meat (mackerel, tuna, and skipjack) against alc. was examd., with regard to freshness of the fish meat.

7.89 COLOR-REACTION METHOD FOR JUDGING THE FRESHNESS OF FISH MEAT. I. COLOR REACTION OF THE COMPONENT RESPONSIBLE FOR FISH ODOR AGAINST P-QUINONE. I.

Obata, Y. and Zama, K.
Bulletin of the Japanese Society of Scientific Fisheries 15, 499-504 (1950)
Chemical Abstracts 49, No. 5, 3434 (1955)

The color reaction with p-quinone was examd. with dil. aq. solns. of NH_3, methylamine, trimethylamine, and piperidine, which have hitherto been thought of as the components responsible for fishy odor.

8.42 HIGH IODEMIA AND THYROXINEMIA IN MIGRATORY AMPHIBIOTIC TELEOST FISHES

Fontaine, M. and Leloup, J.
Congr. intern. biochim., Resumes communs., 2nd Cong., Paris 1952 (1953)
Chemical Abstracts 49, No. 8, 5702 (1955)

8.42 CALCIUM OXALATE CONTENT OF FISH SCALES

Nishihara, Hatasu
Science Repots. Saitama University Ser. B, 1, 159-64 (1954)
Chemical Abstracts 49, No. 8, 5694 (1955)

Oxalic acid, Ca oxalate, and total Ca were detd. in the scales of 30 Japanese species of teleosts. Total Ca and Ca oxalate were higher in marine fishes than in fresh water ones. Oxalic acid content was less than 0.58 percent of dry wt., and Ca oxalate less than 0.84 percent. About 1 percent of total Ca was present as Ca oxalate, suggesting that Ca phosphate and Ca carbonate are very abundant in fish scales. Older fishes had a higher Ca oxalate content than younger ones.

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